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STEEL

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Contents

Volume 109—No. 17 **October 27, 1941**

BEHIND THE SCENES WITH STEEL 4

HIGHLIGHTING THIS ISSUE 19

NEWS
- Real Action Appears in Steel Expansion 21
- 4000 Small Manufacturers at Midwest Subcontract Rodeo 22
- Factions at Great Lakes Steel Patch Truce; Production Proceeds 23
- SWOC Members at Gary Rebel Against Union Dues Inspection 24
- Record Attendance Features National Metal Congress 26
- Award Presentation, Technical Sessions Feature Welding Group Meeting 28
- Financial News of the Steel Industry 30
- Steelworks Operations for Week 31
- OPM Order Drastically Curtails Nonessential Uses of Copper 35
- Men of Industry 40
- Obituaries 41
- War Department's Defense Awards 42
- American Engineers Impressed by Canada's Armament Factories 46
- Canada Extends Wage, Price Control Over All Industries, Commodities 47
- Association Reports Industrial Gas Ample for Defense Needs 48
- Gear Manufacturers Point to Need for Blanket Priority 49
- Foundries' Substitutions "Would Not Be Tried in Normal Times" 50
- August Iron and Steel Exports 109

WINDOWS OF WASHINGTON 32

MIRRORS OF MOTORDOM 37

EDITORIAL—Defense's Greatest Need 52

THE BUSINESS TREND 53

TECHNICAL
- Johnson Semiautomatic Rifle (Conclusion)—By Arthur F. Macconochie 56
- Beryllium—Present Field, Possible Future Applications—By Louis L. Stott 62
- New Bus-Bar Support System—By W. N. Gittings 74
- Offers To License Aircraft Development 80
- Indicates High-Speed Steel Best Opportunity for Conserving Tungsten 82
- Molybdenum Good Substitute To Relieve Tightness in Vanadium 86

Progress in Steelmaking
- Electro-Tinning Using Sodium Stannate Bath—By S. Baier 66

Heat Treating
- Heating Ordnance—Gun Mounts and Barrels, Section IV—By E. W. Weaver 72

Materials Handling
- Semiautomatic Materials Handling Triples Output—By M. D. Heyman 77

Joining and Welding
- How To Get Most from Arc Welding, Section VI—By E. W. P. Smith 84

INDUSTRIAL EQUIPMENT 88

MARKET REPORTS AND PRICES 95

CONSTRUCTION AND ENTERPRISE 110

INDEX TO ADVERTISERS 118

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ALLOYS

Timely information about metals... CATALOGUED for your convenience

Specific answers to many of your questions about the selection, fabrication and uses of Nickel alloys are available to you quickly from our files.

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HIGHLIGHTING
THIS ISSUE OF
STEEL

■ NEWS of the week is cheerful in spots, somber in others. "Despite hell and high water," as the saying goes, in this case strikes and other interferences, ingot production figures for the year to date went over the full-year 1940 mark of 66,982,000 tons **(p. 31)**, and the Steel Institute says the year's total will be 82,000,000 tons, 50 per cent of the world's. . . . Strike at Great Lakes Steel was settled by compromise between warring unions factions **(p. 23)**, a significant point in the truce being that the union "ins" have agreed to give the union "outs" a statement of union finances, regularly. . . . The labor situation at Chicago **(p. 24)** was quieter, while at Pittsburgh **(p. 23)** it was "getting out of hand" again, with the captive coal-mine strike threatening. . . . Steelworks expansion projects **(p. 21)** were showing real action. . . . The industrial association convention season was in full tide, capped by a record turnout for the great Metal Congress **(p. 26)**.

• • •

Copper Curtailed

In the most drastic order yet promulgated, the use of copper has been virtually prohibited **(p. 35)** for a substantial majority of civilian products. A shortage of 750,000 tons in 1942 is predicted by defense officials. . . . Canada, spending 50 per cent of national income for war purposes, has achieved **(p. 46)** a remarkable production of ordnance materials . . . The foundry industry **(p. 50)** in the emergency, is attempting substitutions that "never would be attempted in normal times".

• • •

Red, White and Blue

Three mobile defense production clinics **(p. 34)** —special trains painted red, white and blue— will carry samples of needed defense materials to potential manufacturers through the country. . . . American gear manufacturers in convention in Chicago **(p. 49)** point to their difficulties in meeting defense requirements without a blanket priority order, so far denied them. . . . Canada obtaining good results with its wage-price policy, as outlined in STEEL, Oct. 20, p. 47, broadens the order to include all industries. . . . Few "bottlenecks" are apparent in the supply of industrial gas **(p. 48)** it is reported at the annual meeting of the American Gas Association.

• • •

How Johnson Rifle Works

This week Professor Macconochie concludes his discussion on the Johnson semiautomatic rifle **(p. 56)**, taking up such problems as velocity of recoiling barrel, hammer design and War Department specifications. . . . Features of electro-tinning when using the stannate bath are presented **(p. 66)** by S. Baier. . . . W. N. Gittings **(p. 74)** tells of a new bus-bar support system recently installed in a hot strip mill. . . . According to a report made to OPM **(p. 82)**, high-speed steel presents best opportunity of conserving tungsten. . . . Joint selection in welding **(p. 84)** and how to evaluate various factors involved are pointed out by E. W. P. Smith.

• • •

Beryllium— Future Uses

An enlightening presentation on beryllium, its possible future applications is offered by Louis L. Stott **(p. 62)**. . . . Furnaces used in heat treating gun mounts and barrels and reasons such furnaces are used are explained **(p. 72)** by E. W. Weaver. . . . M. D. Heyman **(p. 77)** tells about a system for feeding presses which speeds handling of materials and triples output. . . . A method of attaching fabric to control surfaces of airplanes **(p. 80)** is being offered under license by Bell Aircraft. . . . Report to OPM **(p. 86)** points out molybdenum is a good substitute for vanadium in some applications. . . . A hand profiler described under Industrial Equipment **(p. 89)** is capable of handling intricate work such as encountered in breech mechanisms of small arms.

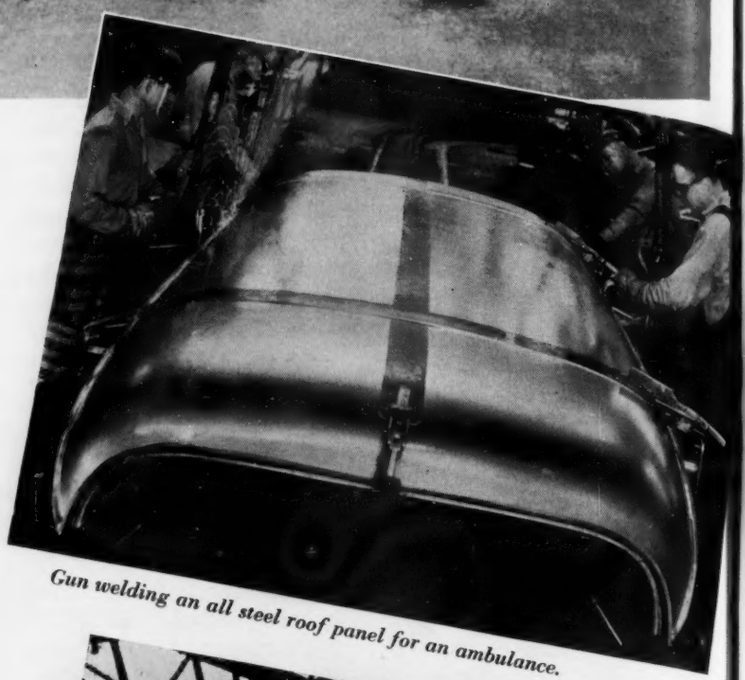
Refugee kiddies inspect a new ambulance presented by the British-American Ambulance Corps.

Some Inland Defense Steel Goes on Errands of Mercy

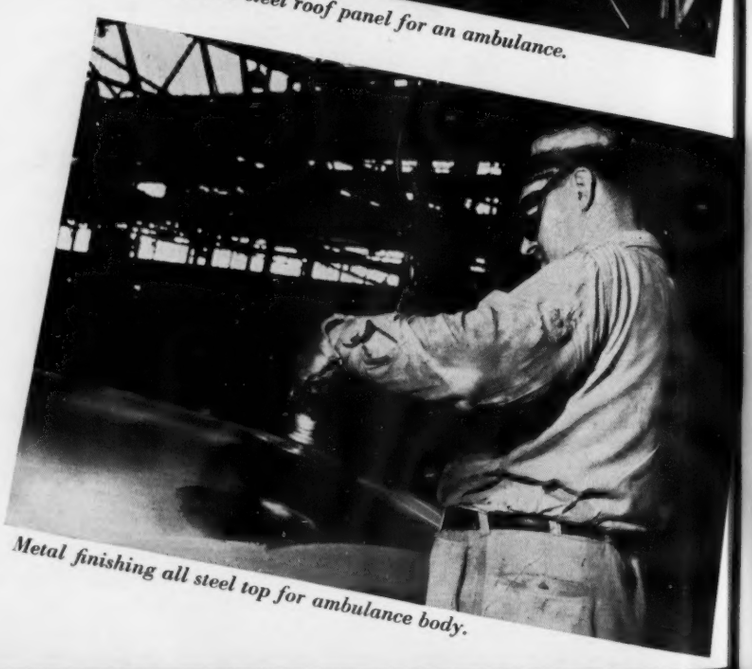
Every day Inland ships thousands of tons of steel for the Defense Program. A large part of the tonnage is used for constructing new plants, building equipment and manufacturing munitions. However, some Inland Defense Steel goes on errands of mercy. Typical of this are the Inland Sheets used by automobile manufacturers in building ambulances for service not only in our own army camps, but also in the camps and among the civilian populations over seas.

Inland has always been proud of its ability to serve customers well through a closely knit organization, complete control of raw materials and modern plants. And now—because defense is Inland's No. 1 Job, all Inland men and all Inland facilities are coordinated in serving our Government to the fullest extent possible in the present emergency.

SHEETS · STRIP · TIN PLATE · BARS · PLATES
FLOOR PLATE · STRUCTURALS · PILING · RAILS
TRACK ACCESSORIES · REINFORCING BARS



Gun welding an all steel roof panel for an ambulance.



Metal finishing all steel top for ambulance body.

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Real Action Appears in Steel Expansion; More Blast Furnaces "Needed"

Federal loan administrator announces financing completed for 5,400,000 tons of iron capacity . . . Three new electric steel plants authorized . . . Bessemer converter to make synthetic scrap . . . Plate mill for West Coast

■ PLANS for expanding pig iron and steel producing capacity to meet the greater demand for national defense are developing more rapidly.

Defense Plant Corp., RFC subsidiary, last week announced agreements had been reached with six additional companies for government-financed facilities and the leading producer announced a large privately-financed program.

A $15,000,000 expansion at the Gary, Ind., steelworks has been announced by Carnegie-Illinois Steel Corp. Program is a part of the expansion recommended by the OPM, but the cost of the new facilities will be borne by Carnegie-Illinois.

Work will begin immediately on the construction of a new open-hearth furnace, the rebuilding and enlargement of a blast furnace, installation of greater soaking pit capacity, the rebuilding of a battery of coke ovens and provision of additional ore unloading facilities. The new facilities are to be completed as soon as possible.

The new open-hearth furnace, to be installed in the No. 5 open-hearth department at Gary, will provide an increased annual ingot production of 300,000 net tons. Enlargement of Gary Works blast furnace No. 7 to an annual capacity of approximately half a million tons will double its present capacity.

Seventeen rows of soaking pit furnaces will be replaced to increase their capacity from 2,000,000 to 2,500,000 net tons annually. The 70 ovens of by-product coke ovens battery No. 6 will be rebuilt to provide an annual capacity of 360,000 net tons of coke. The ore unloading capacity of the plant will be increased from 3000 to 4500 gross tons per hour.

Defense Plant Corp. has signed an agreement with Columbia Steel Co., United States Steel Corp.'s West Coast subsidiary, for the construction of plants and the acquisition of facilities for the production of pig iron at Provo, Utah. Cost will be approximately $35,000,000 and annual capacity will be 725,000 tons. It is understood the plant will include three blast furnaces.

DPC Will Retain Title

The facilities will be owned by DPC and operated under lease by Columbia.

Jesse Jones, federal loan administrator, last week also revealed that another agreement with the California company for a $36,000,000 plate mill at Pittsburg, Calif., was under consideration. The project has been recommended by OPM to the Reconstruction Finance Corp. If built, it will have a capacity of 500,000 tons of plates, 30,000 tons of castings, and will require 18 to 24 months for completion.

In Washington last week, it was reported that the construction of a new plant by Bethlehem Steel Co. on the West coast, as recommended in the report on steel expansion prepared by W. A. Hauck, OPM steel consultant, soon would be recommended to Defense Plant Corp. The proposed program includes two blast furnaces, with annual capacity of 864,000 tons; four open-hearth furnaces, with yearly capacity of 648,000 tons of steel; one electric furnace, with capacity of 60,000 tons a year and finishing mills with capacity of 519,600 tons.

To date, Loan Administrator Jones said, the Defense Plant Corp. has provided for 5,400,000 tons of pig iron capacity. Included among the approved pig iron programs are, in addition to Columbia's: Republic Steel Corp., 1,750,000 tons; Bethlehem Steel Co., 1,332,000 tons; Inland Steel Co., 900,000 tons.

The 6,500,000-ton expansion in pig iron capacity recommended by OPM last July is believed sufficient only to protect existing steel ingot capacity, and a new survey of further blast furnace construction necessitated by the recommended 10,000,000-ton increase in steel ingot capacity now is being made by Mr. Hauck.

Meanwhile, the steel expansion program rapidly is taking form, especially electric furnaces.

The Defense Plant Corp. last week confirmed an agreement with Republic Steel Corp. for the construction and equipping of a plant at Canton, O., to produce electric steel ingots at a rate of 318,000 tons annually. Plant will cost $5,140,500.

American Rolling Mill Co. was

asked to build a three-furnace plant at Middletown, O., to produce 43,200 tons of electric steel a year, plant to cost $554,000.

Copperweld Steel Co. was authorized to build and equip a plant at Warren, O., costing $4,000,000 and capable of producing 100,000 tons of ingots annually.

Pacific Car & Foundry Co., Seattle, was authorized to spend $700,000 for new facilities to make castings for ship construction.

Phoenix Iron Co., Phoenixville, Pa., agreed to increase steel ingot capacity by 50,000 tons, with Defense Plant Corp. providing $500,000 to cover the cost.

American Rolling Mill Co. was asked to build a bessemer converter at Ashland, Ky., to cost $842,000. Converter will be used to produce 600,000 tons of synthetic scrap a year. It will complement Armco's large new blast furnace and will provide scrap for company's open-hearth furnaces. Authorization of the converter was occasioned by the acute shortage of purchased scrap.

Four Thousand Small Manufacturers At Midwest Subcontract Rodeo

CHICAGO

■ FOUR thousand small manufacturers in the Midwest, many of whom are facing priorities shutdowns, attended the Defense Production Clinic in Stevens hotel, here, Oct. 22-24, in an effort to obtain defense contracts which will keep their plants operating.

About 150 major companies engaged in military production were represented by purchasing and production experts. Small manufacturers examined the numerous product exhibits, then consulted with representatives of the large companies holding the prime contracts.

The clinic was arranged by the Division of Contract Distribution of OPM, in co-operation with 18 business organizations, Chambers of Commerce and state councils for defense throughout the Middle West, and eight branches of the armed services.

Thomas S. McEwan, clinic director, and Chicago district manager of OPM, said the purpose was to lay the groundwork for subcontract negotiations between the small plants and large prime contractors.

"Effect of these conferences between the big and little fellows is mainly educational," said Mr. McEwan. "We expect some subcontracts to be signed on the spot, but most of them will be negotiated in more exhaustive dealings later. The preliminary work is being done here."

Of the 1500 or more companies represented in subcontracting conferences with prime contractors, about one-third were found to be qualified to handle armament work, it was estimated. Prime contractors reported excellent potential facilities were uncovered and a large number of subcontracts will result ultimately. Inspections of the small plants is required in many instances before work can be farmed out.

One of the most complete exhibits was that of the Chicago Ordnance District, which transferred most of its display to the clinic floor.

Three of the 150 participating prime contractors went home at the close of the first day, declaring they had found enough companies with proper facilities to take care of all the defense work they had sought to sublet. These were Oilgear Co., Milwaukee; King Seely Corp., Ann Arbor, Mich.; and Yates-American Machine Co., Beloit, Wis.

Five subcontracts were signed on the floor the first day—three by Hurley Machine Division of Electric Household Utilities Corp., Chicago; and two by Stewart-Warner Corp., Chicago.

Floyd B. Odlum, director of the Contract Distribution Division, declared the division's emphasis will be not on saving little nondefense industries from priorities shutdowns, but on converting them to defense work. He disclosed a plan is being worked out whereby large companies with prime contracts will "adopt" smaller industry "for the duration" to place employes of the latter to work on defense orders.

"We are endeavoring to get the aviation industry to adopt the aluminumware manufacturers. Curtiss-Wright Airplane Co. has agreed to let us bring them two hard-hit units of the aluminumware industry to make parts for airplanes under contract.

"We are working on the same plan for manufacturers of automobile parts and accessories. These could be 'adopted' by tank builders."

Mr. Odlum said the Army and Navy are co-operating fully with his division in promoting subcontracting and in taking remedial action to aid communities and industries hit by government priority and curtailed orders.

Army Tests Steel Plates for Portable Airfields

■ **Perforated steel plates, like these shown being carried into position for testing under simulated war conditions during the Carolina maneuvers of the First Army, are being considered by the War Department for temporary airfields. The "planks" weigh 50 pounds each, are held together with steel clips to prevent sliding. One crew, it is reported, can lay a 450-foot length of the 150 x 3000-foot steel runway in one day. Acme photo**

Factions at Great Lakes Steel Patch Up Truce; Production Proceeds

Wildcats reinstated in SWOC . . . "Ins" to give the "outs" statement of union money . . . Loss to nation is eight days' output . . . A mild-mannered "rebuke" from OPM

DETROIT

■ THE "WILDCAT" strike at Great Lakes Steel Corp. ended last Friday with a compromise among the warring union elements.

The 19 ringleaders of the "outlaws" who had been suspended by the Steel Workers Organizing Committee were reinstated.

There is to be an election of officers of the local within 30 days. Grievances are to be taken up in accordance with the union's contract with the company signed four months ago.

A copy of the union's financial statement and a copy of the contract is to be given each member of the union.

The strike ended when 2000 of the company's 8000 workers voted to return on the night shift Thursday night. Other shifts reported Friday at the customary time.

The steel plant tieup lasted eight days.

Daily loss of output is figured at 5000 gross tons of ingots, 2000 tons of pig iron and 1400 tons of coke. In terms of finished steel this means about 4000 tons daily, of which about 2400 tons was destined directly for defense needs. The Detroit district steelworks operations for the week dropped 36 points to 32 per cent.

Orville W. Kincaid, SWOC organizer at the plant, was reported to have called in FBI investigators to check up on the ringleaders. However, the strikers claimed they were "sold out" by Kincaid, and attempted to set up a new organization and new officers. This was before the compromise.

James F. Dewey, federal conciliator, who had participated in negotiations, bluntly called the strike "sabotage".

Moves To Avert Captive Coal Strike

WASHINGTON

■ President Roosevelt late Friday suggested to William H. Davis, chairman, National Defense Mediation Board, that he request Myron C. Taylor and John L. Lewis to head two respective groups of a joint board to attempt to solve the dispute over unionization of the captive coal mines, and in the meantime the President requested Mr. Taylor and Mr. Lewis to arrange for continuation of production under the temporary agreement which has been in effect since Sept. 19.

The joint board was one of two alternatives which were communicated by Chairman Davis to both the mine owners and to Mr. Lewis, with the request that they agree to accept the decision of either of the two negotiations which they might decide on. The situation involves mines producing 50,000,000 tons out of a total of 450,000,000 tons, and about 53,000 miners, including those in Alabama.

The second procedure was a suggestion for a joint board to be made up from the present membership of the mediation board, but from the fact that the President had suggested direct negotiations by representatives of the two principals in the controversy it was strongly indicated that if any plan is agreed to the President's proposal would be the one.

Rumblings at Pittsburgh

PITTSBURGH

The labor situation here is rapidly getting out of hand. The difficulty appears to be with local union bosses, as in most cases the nature of their demands or grievances is not approved by international or regional officers, and in some instances is almost entirely unknown to them.

As an example of what is going on, the leader of one local here recently went to the company management and demanded that the men be paid in cash every other Friday, up to and including that day. This meant making up a payroll for several hundred men in one day, as well as estimating the time worked by each on that day. However, the leader sent in word that he would call out the men if the request was refused.

At another plant the union refused to let foremen enter until they paid dues, although it is expressly stated in their contract that foremen are not permitted to join the union.

Another plant, which already has the closed shop and checkoff, was asked by union leaders to fine each member 25 cents through deduction from his pay if he failed to attend union meetings. When this was done the men went out on strike until the union heads finally gave in and permitted the company to repay the fines.

Petty squabbles such as these have lost thousands of man-hours of defense work in this district.

The drive for a closed shop and checkoff in the steel industry here is imminent. Some of the locals are on record with resolutions favoring that action. Word goes out to the regional and subregional directors that it would be a good thing for them to have their various locals pass resolutions favoring a certain principle. These resolutions are then taken to company management by the international officers, to substantiate their statements that the action does not come from the top, but was initiated by the men, "according to democratic principles."

One thing which thus far has staved off drastic action is the state-

ment of policy on the part of the United States Steel Corp. that no man shall be forced to join a union in order to work.

Determined efforts were being made last week by the defense authorities to avert a strike in the captive coal mines, called for Monday, which, if prolonged, would force serious curtailment in steelmaking operations.

Recently it was estimated stocks of coal on hand in the Pittsburgh area were sufficient for only 29 days operations. Some authorities are of the opinion that actually steel mill coal stocks in the area today are sufficient for little more than two weeks operations.

The mills are most vulnerable in the matter of coke. Acute coke shortage would result in a relatively short period were coal supplies held up.

SWOC Members at Gary Rebel Against Union Dues Inspections

CHICAGO

Renewal of the SWOC-CIO drive for the closed shop in Chicago district plants of Carnegie-Illinois Steel Corp. failed to materialize last week as scheduled. A dues inspection which was to have been conducted at the Gary, Ind., steelworks on Wednesday was called off on the day before, and during the week only one work interruption occurred—this being relatively minor and not directly connected to the union shop issue.

As a result, district steelmaking operations were undisturbed and continued at 102 per cent of capacity, a figure which was only ½-point below the all-time peak attained in three weeks in late spring and early summer. Rate for the week ended Oct. 18 was revised upward 1 point from the reported 101 per cent, as production in plants of Carnegie-Illinois quickly recovered the loss suffered at its South Chicago, Ill., steelworks over the Oct. 11-12 weekend when a work stoppage forced several open-hearth furnaces down temporarily.

Dues Inspection Canceled

A week ago, the union had announced its intention to continue the drive for the closed shop by a dues inspection, reportedly planned to take place inside the gates, at the Gary steelworks, commencing at 7 o'clock Wednesday morning, Oct. 22. This was canceled on Tuesday when local and regional SWOC officials were called to Pittsburgh that night by CIO President Philip Murray. The delegation, which professed not to know why it was called to Pittsburgh, was headed by John Doherty, Chicago, regional director of the SWOC.

No statement has been made concerning the conference with President Murray, but there is speculation as to whether OPM has put pressure on Murray to end the union's efforts to effect a 100 per cent union shop in the steel industry.

The last dues picketing at the Gary steelworks was on Oct. 15.

Another labor disturbance occurred at the Gary sheet and tin mill of the corporation Tuesday, Oct. 21, when 30 cranemen and hookers in the galvanizing and roofing warehouse refused to work and later walked out, forcing the department down and throwing 150 men into idleness. This work stoppage was engineered to indicate discontent over the company's rejection in the previous week of a grievance demanding upward adjustments in incentive payments.

The action of the cranemen and hookers was condemned as a wildcat strike by Frank Grider, CIO organizer and subdistrict SWOC director in Gary; it ended after one shift.

Meanwhile, demands for an open shop and immediate cessation of dues picketing and work stoppages at Gary plants of the corporation have been made by a group of rebel members of the SWOC-CIO.

More than 60 men, most of them from the 80-inch hot strip mill of the sheet and tin works, met Sunday, Oct. 19, in defiance of the drive for a closed shop, and announced that they would work beside "any man who wants to make steel." One exception was made, however, that they would walk off the job if a replacement were sent in for any man removed from his job for nonpayment of dues.

The rebel group elected David Johnston, chairman, and Charles Sanford, secretary-treasurer, and presented four demands to three SWOC grievance officers, present by invitation. The demands were as follows:

1. The right to enter the plant for work without showing dues books.
2. The end of work stoppages.
3. Discontinuance of the practice of forcing men to join the union or pay dues against their will.
4. The right to work unmolested in an open shop.

In answer to this declaration of independence, Grider said that if it were necessary for dues inspections to continue they would be continued and that the SWOC aims were for a closed shop and the checkoff system of dues payments.

Sanford in a statement after the meeting said:

"This situation has arisen be-

■ After independent steelworkers at Gary, Ind., sought an injunction to prevent the CIO from forcibly turning away any Carnegie-Illinois employes who could not show a SWOC card, the CIO dropped its plans and satisfied itself with counting cards as the men went to work. The independents withdrew their petition after the court exacted a promise from CIO that picketing would be peaceful—which included the card-show. Not all workers carried cards, but the CIO representatives did not dare turn them away. NEA photo

cause the men are forced to join an organization to which they do not wish to belong. For many years we had a tranquil situation here and worked in peace. But in the last two years, since the CIO came in, we've had nothing but trouble. You can't repay us for the loss of peaceful working conditions."

Sanford and Johnston added that they intended to drop their SWOC memberships and that they thought fewer than half of the employes in the sheet and tin mill wished to belong to the SWOC. They said the group was not co-operating in any way with the AFL and was only fighting the idea that any organization could force a man to join it against his will.

International Harvester Faces New Strike Threat

CHICAGO

International Harvester Co. is faced with a new strike threat, following authorization last week by 600 shop stewards and executive members of the CIO Farm Equipment Workers Union of a strike call if the company refuses to negotiate issues at stake.

The union is demanding joint company-union action to speed up defense production, union security assurances, and wage adjustments. Union claims company officials had rejected a Department of Labor appeal for a meeting with union representatives, although the company denies this and affirms its willingness to negotiate.

The CIO resolution pledged that should a strike be called, it would be only against the company's non-defense production. Union also promised full support of any National Defense Mediation Board attempts to settle differences, provided the board first obtained a pledge from the company that it would "neither promote nor provoke a strike or a lockout." Failing such a pledge, the union advocated government control of plants until mediation should be successful.

Employes of Link-Belt Co. plant at 300 West Pershing road rejected local 1604 Steel Workers Organizing Committee as bargaining agent by a vote of 585 to 468, in an election ordered by the National Labor Relations Board. The union claimed a majority in the plant nine months ago had petitioned for the election.

OPM Appeals to Management, Labor To End Defense Strikes

WASHINGTON

A mild-mannered statement was made last week by Office of Production Management, addressed as much to management as to labor, following the recent outbreak of strikes. Washington newsmen and commentators lately have indicated that the President is displeased by the strikes and is preparing a "crack down," which may take the form of a strong public statement rather than recommendations for antistrike legislation. Here is OPM's statement:

"The defense program, which is growing larger every day, depends for its success on the patriotic support of labor and management. Uninterrupted production is the pressing need. The interruption of work by strikes or slowdowns is the greatest help the aggressors can get in these days when material on the battlefield is everything.

"The Office of Production Management directs attention to the fact that there is within the government machinery for mediation of disputes before stoppages occur. When any dispute arises, a telephone call to the Conciliation Service of the Department of Labor and the Labor Division of the Office of Production Management will be given immediate attention. Failing settlement, the dispute can be referred to the National Defense Mediation Board for final recommendation.

"These means are provided in order to avoid breaks in production. We must have the man-hours on the job. Our President has said: 'This is not the time to take chances with the national safety through any stoppage of defense work or defense production.'

"The Office of Production Management fully endorses the voluntary system set up to handle disputes, and it expects all parties involved in the production of defense material to take no action which will impede production.

"Time is short. We need the man-hours; your country needs your strength and skill. Let us have all the co-operation and help possible."

The Noose

CHICAGO

■ So confused is the current labor situation in the steel industry that it is difficult to interpret some of the incidents which occur. Here is one, however, in which the meaning is perfectly clear and which probably expresses the sentiments of the majority of American workmen, despite iron-fisted domination by union leaders.

In a steel plant which has suffered numerous unauthorized work stoppages recently, the crew of a rolling mill reported at their posts one morning to find a rope noose suspended from a roof truss. Attached to the noose was a sign which read:

"This is for the next —— who causes us to lose a day's work."

"By What Right?"

Protest against the "entrance of a United States intelligence officer" into the Bell Aircraft Corp., Buffalo, threatened by a strike, was made last week to President Roosevelt by Leo Lamotte, assistant CIO national aviation director. Lamotte wired the President:

"We wish to know by what right this man called upon Buffalo police and entered the plant disguised as a worker."

The union has threatened to strike unless a 20-cent hourly wage increase, and union shop and checkoff are granted.

Bell produces the Airacobra, one of the fastest pursuit ships built.

Buying Power of Hourly Steel Wage Today Far Above 1918

Hourly wages received by steelworkers today go about twice as far as they did in 1918 toward buying certain common articles of food, while their purchasing power for clothing, furniture and other representative manufactured goods shows a still greater increase, according to a study by the American Iron and Steel Institute.

Increase in buying power of hourly steel wages reflects both the 70 per cent rise in average hourly wages between 1918 and the summer of 1941, and the somewhat lower level of prices prevailing today, particularly for manufactured goods.

In 1918, steelworkers received an average of about 58 cents per hour, compared with the average of 99 cents per hour in the summer of 1941.

Prices of such representative foods as bread, milk and round steak during the past summer were about 4 per cent less than in 1918. An inexpensive, all-wool suit of clothes last summer sold for $22.50, or about 25 per cent less than in 1918; the factory price of a typical small, four-door sedan last summer was about $795, or 25 per cent below the price of a 1918 model.

At the average wage and price levels of last summer, a wage earner in the steel industry could buy a quart of milk, a pound of bread and a pound of round steak with his earnings for 39 minutes of work. In 1918, he would have had to work 68 minutes to buy the same amount of food.

On the same basis, a woolen suit last summer could be purchased with the earnings from 22¾ hours of work; in 1918 a comparable suit would have taken 51¾ hours of work.

A low-priced automobile today can be purchased with the average earnings from 803 hours of work; in 1918, it was necessary to work about 1827½ hours.

■ As many thousands attend the metals shows, "popular appeal" is the keynote of some exhibits. On the stage set by U. S. Steel at Philadelphia's Convention Hall was a spectacular operation depicting a ladle pouring molten steel into ingot molds

Record Attendance Features National Metal Congress

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Exhibits, technical papers stress defense production and related conservation, substitution problems

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PHILADELPHIA

■ PRODUCTION for defense and attendant problems of conservation and substitution formed the background for most of the displays and the technical papers at the National Metal Congress and Exposition here last week.

A new record was set for exhibit space, over 300 exhibitors occupying 109,000 square feet, which compares with 103,000 square feet at Cleveland last year, the prior record. Estimates of attendance ranged from 30,000 to 40,000, exact figures not yet available.

Several hundred army and navy ordnance men attended technical sessions and examined exhibits which included practically every type of equipment of interest to them, from portable field kitchens and bomb shelters to large guns and ammunition. Also shown were a fully armed M-3 tank, chemical warfare equipment, warplane engines, parachutes, and the like.

The Congress and Exposition were sponsored by the American Society for metals in co-operation with the American Welding Society, conducting its twenty-second annual convention; American Institute of Mining and Metallurgical Engineers, with the fall meeting of its Institute of Metals and Iron and Steel Divisions; and the Wire Association, holding its annual meeting.

A feature of the program of the American Society for Metals that attracted wide attendance was a series of 14 technical sessions devoted to defense production problems, conservation and substitution.

1,650,000 Tons Copper Available

The recent order restricting copper made the meeting, devoted to copper and its alloys, of particular interest. At this meeting it was stated that 1,650,000 tons of new copper was estimated to be available in 1942, including some 600,000 tons to be imported. Earmarked for defense requirements are 530,000 tons for shell cases, 200,000 tons for electrical equipment, 100,000 tons for cable to protect ships against magnetic mines, and an allowance of 170,000 tons for England. Also 300,000 tons are set aside for use indirectly in electrical equipment, and elsewhere.

This total of 1,300,000 tons leaves an apparent surplus of 350,000 tons for civilian consumption. And this does not include secondary copper which may run the total available up to 450,000 or 500,000 tons, an amount more than 40 per cent above actual consumption in such years as 1932, 1933 and 1934, and comparing well with a normal estimated consumption of 700,000 tons.

Typical of the ever-changing substitution picture is brass. The original trend toward higher copper, lower zinc specifications to conserve zinc has now been replaced by higher zinc, lower copper orders, since copper appears the scarcer.

What manufacturers are experiencing regarding substitutions was revealed. In one case, a small manufacturer of caps for vacuum bottles originally used aluminum. When this became unobtainable, he shifted to nickeloid, and subsequently to steel when nickel became scarce; then to plastics. But with the restrictions on formaldehyde—used in making plastics—he turned to glass. Except for some difficulty in getting the threads, which is expected to be cleared up soon, this last material may be his answer to the problem.

Some users are employing unique methods to conserve materials. For

instance, members of the Bell Telephone System are saving copper by use of steel lines in rural districts (with loss in electrical efficiency); by use of copper-steel alloys; by making line repairs instead of line replacements; by not allowing for future expansions. New carrier systems permit 12 or more channels on a single wire circuit.

In addition to the defense series, the American Society for Metals' program included 12 technical sessions, the Edward DeMille Campbell memorial lecture, a five-period lecture course on heat flow in metals, a three-period lecture course on hardness and hardness measurements, the annual business meeting and the annual banquet.

J. B. Austin, United States Steel Corp.'s Research Laboratories, conducted the five-period course on heat flow, while S. R. Williams, Amherst college, presented the series of hardness discussions.

At the twenty-third annual business meeting of the American Society for Metals, a total membership of 12,684 was reported, 14 per cent more than last year. Of the 60 ASM papers presented at the Congress, 55 are available in printed form. Officers elected for 1941-1942 are:

Bradley Stoughton, dean of engineering, Lehigh university, Bethlehem, Pa., president; H. J. French, in charge of alloy steel and iron development, International Nickel Co., New York, vice president; William H. Eisenman, re-elected secretary; Francis B. Foley, superintendent of research, Midvale Co., Philadelphia, treasurer.

Newly elected trustees included Norman F. Tisdale, metallurgist, Molybdenum Corp. of America, Pittsburgh; Kent R. Van Horn, research metallurgist, Aluminum Co. of America, Cleveland. Dr. Oscar E. Harder, retiring president, will also be a trustee.

The Albert Sauveur Achievement award for 1941 was presented to Albert L. Marsh, president, Hoskins Mfg. Co., Detroit. Henry Marion Howe medalists were: Dr. M. A. Grossman, director of research, Carnegie-Illinois Steel Corp., Chicago; M. Asimow, metallurgist, Central Metal Products Co., Los Angeles; S. F. Urban, metallurgist, South Works, Carnegie-Illinois Steel Corp., Chicago.

Certificates of appreciation were presented to the two men giving the lecture courses previously mentioned, J. B. Austin, physical chemist, United States Steel Corp. Research Laboratories; Samuel R. Williams, professor of physics, Amherst college, Amherst, Mass.

The Edward DeMille Campbell Memorial lecture on "Pearlite" was delivered Wednesday morning by

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■ **Elaborate display of defense items by Republic Steel Corp., Cleveland, included several heavy, fast-firing naval guns**

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One of the unusual items at Revere Copper & Brass Co.'s exhibit was a fully equipped undersea diving rig

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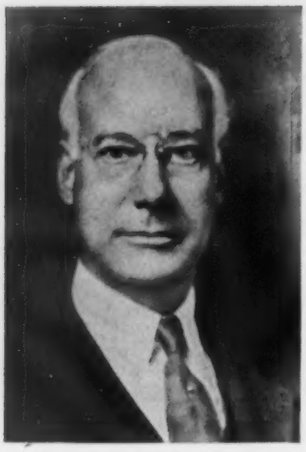
M-3 medium tank was exhibited by Great Lakes Steel Corp., Ecorse, Mich.



Bradley Stoughton
Dean of engineering, Lehigh University, Bethlehem, Pa., elected president of American Society for Metals

H. J. French
Elected vice president of American Society for Metals. He is associated with International Nickel Co., New York

Robert F. Mehl, Carnegie Institute of Technology. A high point was a presentation of the results of the first studies of steel with the electron microscope. Since opaque specimens usually examined by the metallurgical microscope cannot be used with the electron microscope, special preparation is required. After the surface of the specimen is ground, polished and etched in the usual manner, a layer of silver is deposited by vaporization. The silver then is stripped off and collodion deposited on the silver. The collodion then is stripped from the silver and placed in the electron microscope for close examination under extremely high magnification.

Photomicrographs taken at a magnification of 50,000 diameters were shown on the screen. Compared to maximum power of the usual metallurgical microscope of 2500 diameters, this is a significant advance, opening new fields of investigation to the metallurgist. In fact, that which formerly was thought to be nodular troostite appears actually to be fine lamellar pearlite. Power of the instrument is so great that it can resolve down to 50 atom diameters.

Latest investigations detailed by Mr. Mehl show that the state of homogeneity of austenite largely affects hardenability, thus accounting for heretofore unexplainable differences in hardenability. Rate of nuclei formation, rather than rate of nuclei growth determines speed of formation of pearlite. Free carbide speeds pearlite formation by increasing rate of nuclei formation. Thus hardenability appears affected by grain size; composition of the steel; and by inadequate carbide solution, the last factor being the one heretofore unrecognized as having an important bearing on this problem.

Presentation of Awards, 19 Technical Sessions Feature American Welding Society's Meeting

■ REGISTRATION at the twenty-second annual meeting of the American Welding Society exceeded by nearly 1000 the previous record of 1683, established at Cleveland last year. Held the week of Oct. 20 in Philadelphia as part of the 1941 National Metal Congress and Exposition, the program included 19 technical sessions with 63 papers, annual business meeting, annual banquet, and session for award presentation.

The Samuel Wylie Miller Memorial medal was presented to David Arnott, vice president and chief surveyor, American Bureau of Shipping, New York, and second vice president of the American Welding Society for "conspicuous contributions to art and science of welding.

Award of the Lincoln gold medal, donated by James F. Lincoln, president, Lincoln Electric Co., Cleveland, was made to Robert H. Aborn, research laboratory, United States Steel Corp., Kearny, N. J. Award, presented for the paper that contributes most to the year's development of welding, was made for "Metallurgical Changes at Welded Joints and the Weldability of Steels," published in the October, 1940, issue of *The Welding Journal.*

The 1940 Lamme medalist was Comfort A. Adams, consulting engineer, Edward G. Budd Mfg. Co., Philadelphia.

Resistance Welders Manufacturers' Association prizes for papers contributing to progress in resistance welding were: First prize of $300 jointly to A. M. Unger, K. A. Matis and E. P. Cruca, all with Pullman-Standard Car Mfg. Co., Chicago; second prize of $200 jointly to G. S. Mikhalapov, director of research, Taylor-Winfield Corp., Warren, O., and to G. N. Weygandt; third prize of $100 to J. R. Fletcher, Edward G. Budd Mfg. Co., Philadelphia; fourth prize of $25 to A. M. Unger, development engineer, Pullman Standard Car Mfg. Co., Chicago; fifth prize of $25 jointly to W. B. Kouwenhoven and J. Tampico, both of Johns Hopkins university, Baltimore; sixth prize of $25 jointly to M. L. Wood, J. Babin and O. B. Atkin; seventh prize of $25 jointly to H. B. Axtell and R. L. Ringer.

Awards in the Summerill Aircraft contest were presented as follows: Hanford Eckman, Piper Aircraft Corp., Lock Haven, Pa., first prize of $300; F. H. Stevenson, Vega Airplane Co., Burbank, Calif., second prize of $200; third prize of $100 divided equally between F. R. Kostoch, North American Aviation Inc., Inglewood, Calif., and C. J. Hertel, Douglas Aircraft Co. Inc., Santa Monica, Calif.

At the annual meeting, officers elected by the society for 1941-1942 were: President, Col. Glen F. Jenks, Ordnance Department, United States Army, Washington; first vice president, K. L. Hansen, consulting engineer, Harnischfeger Corp., Milwaukee; second vice president, David Arnott, chief surveyor, American Bureau of Shipping, New York, all re-elected. New treasurer is O. B. J. Fraser, director of technical service on mill products, International Nickel Co., Bayonne, N. J. Other new officers include: New York and New England district vice president, Edwards R. Fish, chief engineer, Boiler Division, Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.; Middle Eastern District vice president, A. G. Bissell, Bureau of Ship Construction and Repair; Middle Western District vice president, Leslie S. McPhee, supervisor of welding, Whiting Corp., Harvey, Ill.; Southern District vice president, J. A. Hall, engineer of steel plate construction, Kansas City Structural Steel Co., Kansas City, Mo.; Pacific Coast District vice

Glen F. Jenks

Colonel, Ordnance Department, United States Army, Washington, re-elected president, American Welding Society

Klaus L. Hansen

Re-elected first vice president of American Welding Society. He is consulting engineer, Harnischfeger Corp., Milwaukee

Robert H. Aborn

Recipient of the Lincoln gold medal. He is a member of the staff of the Research Laboratory, United States Steel Corp., Kearny, N. J.

David Arnott

Re-elected second vice president of American Welding Society. He is chief surveyor, American Bureau of Shipping, New York. He also received the Samuel Wylie Miller Memorial medal for 1941

president, N. F. Ward, associate professor of mechanical engineering, University of California, Berkeley, Calif.

Elected as new directors were: Fred L. Plummer, chief research engineer, Hammond Iron Works, Warren, Pa.; R. G. LeTourneau, president, R. G. LeTourneau Inc., Toccoa, Ga.; Frank B. Bolte, process standards engineer, Boeing Aircraft Co., Seattle; Roger W. Clark, General Electric Co., Schenectady, N. Y.

In Colonel Jenk's report at the annual business meeting, he called attention to the recent standards work, the most urgently needed of which is in the field of aircraft welding. By OPM request, the society organized an Aircraft Welding Standards Committee. Taylor-Winfield Corp. offered the services of George S. Mikhalapov which were accepted and work now has been in progress several months.

Offer of prizes by the Summerill Tubing Co., Bridgeport, Pa., has stimulated the submission of papers on the welding of aircraft steels. The Welding Society, now 22 years old, reports a membership of over 4700. Annual budget of the Welding Research Committee was increased to about $140,000 for the coming year.

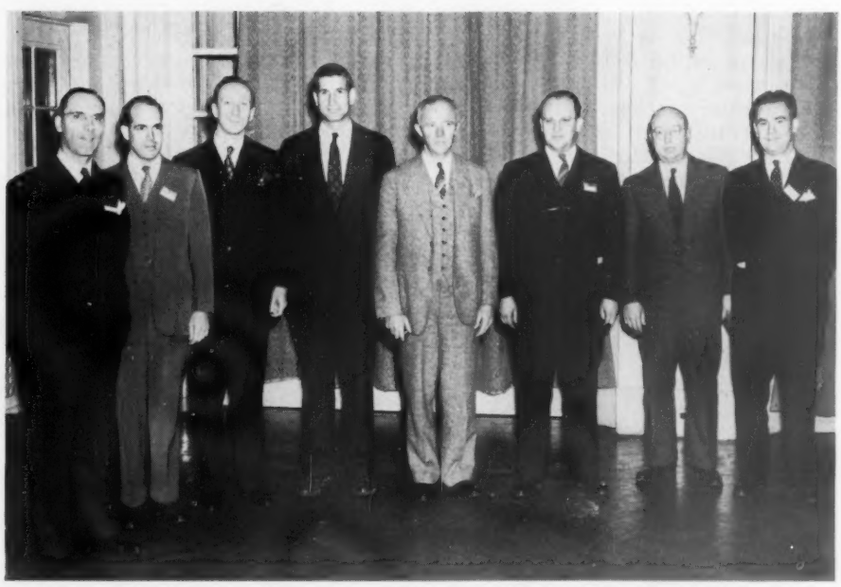
Technical reports and bulletins approved for publication include: "Specifications for Welded Highway and Railroad Bridges (1941 edition);" "Tentative Standard Qualifications Procedure;" "Recommended Procedure for Welding or Cutting Containers of Combustibles;" and "Thermal Stresses and Shrinkage in Welded Ship Construction."

The following codes were raised from a tentative to standard status: A.W.W.A.-A.W.S Specifications for Elevated Steel Water Tanks, Standpipes and Reservoirs; Rules for Field Welding of Steel Storage Tanks.

New technical committees include those on resistance welding standards, aircraft resistance welding standards, weldability tests for steel, standard procedures of welding, standards for welded joints, standards for machinery construction.

Committee on Building Codes has completed work on the new "Code for Arc and Gas Welding in Building Construction" which is now being completed.

Receive Awards for Resistance Welding Papers



■ **Left to right: M. S. Clark, president, Resistance Welder Manufacturers' Association, Federal Machine & Welder Co., Warren, O.; G. N. Weygandt; G. S. Mikhalapov, director of research, Taylor-Winfield Co., Warren, O.; J. R. Fletcher, E. G. Budd Mfg. Co., Philadelphia; W. B. Kouwenhoven, professor of electrical engineering, Johns Hopkins University, Baltimore; A. M. Unger, Pullman Standard Car Mfg. Co., Chicago; M. L. Wood and John Babin, both with Chase Brass & Copper Co., Waterbury, Conn.**

Wire Group Cites Need for Unity

■ NECESSITY for national unity in the execution of the national defense program was stressed at the Wire Association meeting at the Hotel Philadelphian.

F. A. Westphal, Sheffield Steel Corp., Kansas City, Mo., and past

(*Please turn to Page* 94)

FINANCIAL

Crucible Steel Co.

■ CRUCIBLE Steel Co. of America, New York, earned a consolidated net income of $1,677,640 after provision of $4,033,108 for federal taxes in the quarter ended Sept. 30, it was reported last week. This was equal to $2.83 per share on common after preferred dividend requirements, and compared with revised net income of $1,404,282 or $2.22 per common share in the preceding quarter. In the first three months this year, net profit was $1,193,142 or $1.74 per share on common.

Total net profit in the first nine months was $4,275,064, after $10,486,300 provision for federal income and excess profits taxes and after setting aside an additional $750,000 for extraordinary contingencies. Equal to $6.79 per common share, this compared with $3,554,698 or $5.17 per share on common in the corresponding period in 1940. Taxes in the nine months last year totaled $2,177,004.

Wickwire Spencer

Wickwire Spencer Steel Co., New York, and its wholly-owned subsidiary, American Wire Fabrics Corp., report consolidated net income in the third quarter this year was $556,305 after depreciation and interest but before provision for federal taxes. This compared with profit of $125,861 in the corresponding period in 1940, and $460,256 net income earned in the June quarter this year.

Indicated net profit in the first nine months, compiled from quarterly reports and before federal taxes, was $1,247,733, against $314,310 indicated net deficit in the nine months in 1940.

Pittsburgh Coke & Iron

Pittsburgh Coke & Iron Co., Pittsburgh, reports net income in the quarter ended Sept. 30 was $258,566 after provision of $238,000 for federal income and excess profits taxes. Equal to 38 cents per share on common after preferred stock dividend requirements, this compared with a net profit of $291,193 or 42 cents per common share in the corresponding period in 1940. Earnings in the June quarter, 1941, totaled $227,690, equal to 33 cents per share on common.

Total net income in the first nine months this year was $703,686, after provision of $800,000 for federal taxes, and was equal to $1.01 per common share after the preferred dividend requirements. In the period last year, net profit was $588,078 or 80 cents per share on common.

Truscon Steel

Truscon Steel Co., Youngstown, O., subsidiary of Republic Steel Corp., Cleveland, earned $302,064 net income after provision for repairs and maintenance, depreciation and estimated federal income and excess profits taxes, in the three months ended Sept. 30. This compared with $363,293, net income in the corresponding period last year, and with $728,657 profit in the June, 1941, period.

In the first nine months this year, indicated net profit as calculated from quarterly reports was $1,524,108, against $695,953 in the first three quarters of 1940.

M. A. Hanna Co.

Third quarter consolidated net income reported by M. A. Hanna Co., Cleveland, iron ore, coal and shipping operator, was $1,006,168 after all charges including a $250,798 provision for federal taxes. This was equal to 83 cents per common share after preferred dividend requirements, and compared with $912,607 net income or 74 cents per share on common in the period last year, when federal tax provision was $170,651.

Net profit in the first nine months totaled $2,578,712 after $645,968 federal taxes, and was equal to $2.06 per common share. This compared with $2,016,915 or $1.51 per share on common in the corresponding period in 1940. Provision for federal taxes in the latter period was $309,279.

Rustless Iron & Steel

Rustless Iron & Steel Corp., Baltimore, reports third quarter net profit after provision for depreciation and depletion, interest and income and excess profits taxes totaling $1,354,600, was $545,740. This was equal to 56 cents per common share after preferred dividend requirements, and compared with net profit of $300,675 in the corresponding period last year. Tax provision in the latter period aggregated $309,800.

Net profit in the first nine months this year, after all charges including $3,719,300 tax provision, was $1,710,201 or $1.77 per common share. This compared with $767,340 net profit in the period last year, when total tax accrual was $654,340.

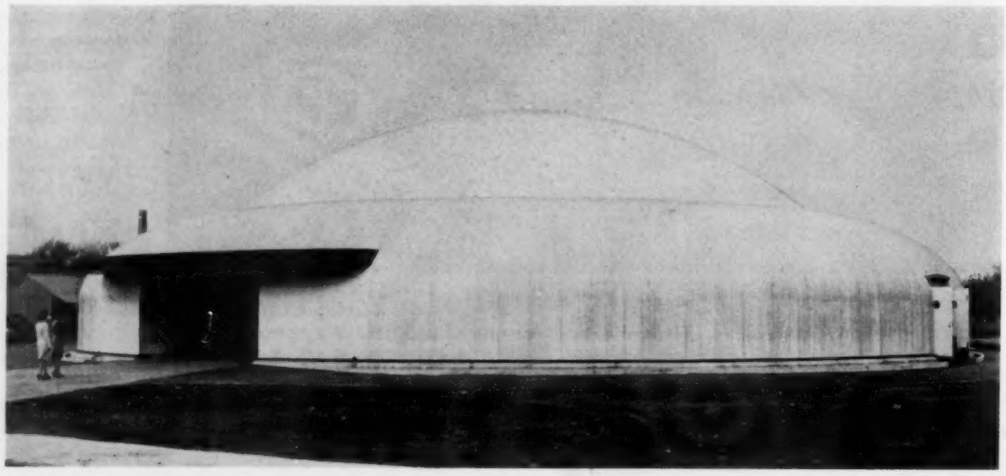
Otis Steel Co.

Otis Steel Co., Cleveland, last week declared a dividend of $2.75 per share on its convertible first preferred stock, payable Dec. 15 to record of Dec. 1. This payment represents quarterly dividends on the convertible first preferred which accrued March 15 and June 15, 1940.

■ United States Steel Corp. common stockholders of record Aug. 20, numbered 164,227, a decrease of 646 since May 20. On May 20 there were 164,873 common stockholders, an increase of 1734 since Feb. 20, 1941. Preferred stockholders of record Aug. 1 totaled 68,865, an increase of 326 since May 2. On May 2, there were 68,539, an increase of 85 since Feb. 3, 1941.

Without Beams

■ Welded steel igloo, reported to be "the first steel building without beams, and the first of eggshell construction." The unit is 108 feet in diameter, 28 feet high, and is made entirely of "dished" plates, three-sixteenths inch thick. It will be used as a lunchroom for employes of Chicago Bridge & Iron Co., Chicago. Acme photo



Electric Steel Output To Be Near 3,000,000 Tons

■ TOTAL production of electric furnace steels during 1941, used mostly for defense purposes, will probably establish a new record of not far from 3,000,000 net tons, according to the American Iron and Steel Institute. That tonnage is more than three times total electric furnace ouput in the four-year period 1915-1918, and fully 13 times the average annual output during the first World War.

Record-breaking production this year would not have been possible if the steel industry had not expanded its electric furnace capacity by 85 per cent in the past two years to meet defense demands. As recently as Dec. 31, 1939, the total rated capacity was less than 1,900,000 tons. By the end of 1941, this capacity will be close to 3,500,000 tons.

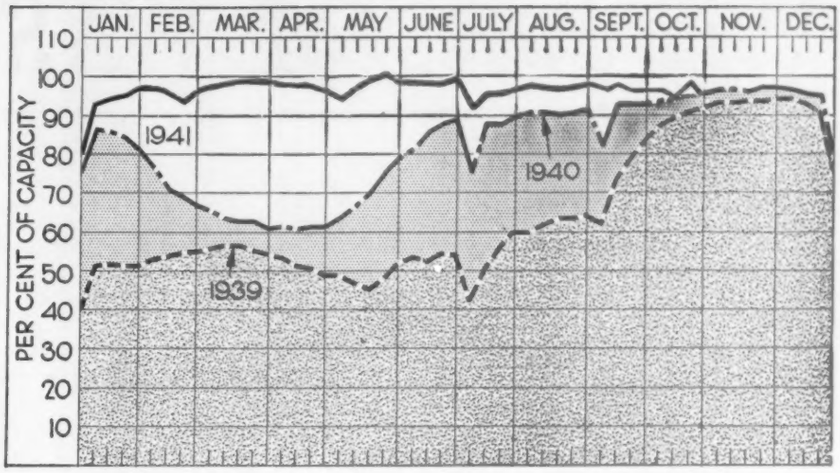
Close estimates of the production of alloy steels this year are not yet available The industry's capacity for producing alloy steels, however, is now above 8,000,000 tons per year, and actual production this year will probably not be far from that figure.

By comparison, alloy steel production averaged only 1,550,000 tons per year from 1915 through 1918.

In 1915, less than a decade after the first electric steel melting furnace was installed in this country, a little less than 52,000 tons of electric furnace steel ingots were produced, and 1,034,000 tons of alloy steels. By 1918, production had risen to 451,000 tons of electric furnace steels and 1,928,000 tons of alloy steels.

1940 Exceeded

■ At 12:30 p.m., Oct. 24, a steel furnace somewhere in America poured a heat which brought production this year ahead of the record-breaking total of 66,982,000 tons for all of 1940, according to the American Iron and Steel Institute. Total output this year will approximate 82,000,000 tons, or about half the world production.



PRODUCTION . . . . Down

■ PRODUCTION of open-hearth, bessemer and electric furnace ingots last week declined 1 point to 95½ per cent, as a result of a strike at Detroit and scrap shortage at Buffalo. Four districts advanced, three declined and five were unchanged. A year ago the rate was 95½ per cent; two years ago it was 92 per cent.

Youngstown, O. — Consistently maintained operations at 98 per cent, which has been little varied for five months. Outlook for this week is for the same rate.

Cincinnati — Two open hearths were lighted as scrap supply increased, raising the rate 3½ points to 91½ per cent.

St. Louis—Continued at 83 per cent, with 24 open hearths in production.

Detroit — With 17 open hearths idle, all but one because of a strike, the steelmaking rate dropped 36 points to 32 per cent, the lowest level in the history of the district.

Chicago — Increased 1 point to 102 per cent, ½-point below the all-time high early in the year.

Cleveland—Declined 2 points to 97 per cent as one open hearth was taken off for repair.

Birmingham, Ala.—Steel production was unchanged at 95 per cent, though a strike cut into pig iron production slightly.

Pittsburgh—Gained 1 point to 99 per cent of capacity.

Wheeling—Slight addition to active equipment advanced the rate 1 point to 94 per cent.

Central eastern seaboard — Unchanged at 93 per cent of capacity.

New England—Remained at 90 per cent for the third consecutive week.

Buffalo—Dropped 9½ points to 83½ per cent as Bethlehem Steel Co. shut down five open hearths because of lack of scrap.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Oct. 25	Change	Same week 1940	Same week 1939
Pittsburgh	99	+ 1	92	91
Chicago	102	+ 1	98	90
Eastern Pa.	93	None	93	72
Youngstown	98	None	91	92
Wheeling	94	+ 1	93.5	93
Cleveland	97	— 2	90	90
Buffalo	83.5	— 9.5	90.5	93
Birmingham	95	None	97	94
New England	90	None	90	90
Cincinnati	91.5	+ 3.5	94	88
St. Louis	83	None	82.5	80
Detroit	32	—36	97	95
Average	95.5	— 1	95.5	92

Finished Steel Output in 9 Months 48,436,943 Tons

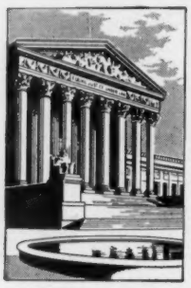
■ Production of finished steel in September amounted to 5,384,817 net tons, according to the American Iron and Steel Institute. Exports in the month totaled 560,720 tons and shipments to members of the industry for further conversion, 325,788 tons.

For the first nine months this year total output is reported as 48,436,943 tons; exports, 4,161,156. Shipments to members for further conversion were 3,197,095 tons.

■ Facilities of Dufferin Shipbuilding Co., Toronto, were recently purchased by the Canadian government, through the Department of Munitions and Supply, at a reported price of $975,000. Intention, according to C. D. Howe, minister of munitions and supply, is to enlarge the works to make it the largest inland shipyard in the Dominion.

Windows of WASHINGTON

Tank production program will be doubled; new plants to be constructed and present ones enlarged . . . Special trains to tour country to enlist more manufacturers in defense manufacture . . . OPM enlarges staff. Will have 11,000 on payroll by end of year . . . S. E. Hackett resigns as deputy chief of Iron and Steel Branch



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ PRESENT tank production program will be doubled, President Roosevelt announced last week. The increased production will be accomplished by building new tank plants and by increasing the size of present ones.

Original tank program now is in full swing, the President said.

At the end of this month, the government will cease to release aircraft production figures.

Die Casting Defense Industry Advisory Committee Appointed

OPM has announced formation of a Die Casting Defense Industry Advisory Committee as follows: G. M. Rollason, manager, die casting division, Aluminum Co. of America, Pittsburgh; Charles Pack, president, Doehler Die Casting Co., Toledo, O.; R. C. McCague, president, Kiowa Corp., Marshalltown, Iowa; Norman A. Parker, president, Parker White Metal & Machine Co., Erie, Pa.; George L. Meyer Jr., general manager, Stewart Die Casting Division, Stewart Warner Corp., Chicago; Carl Heussner, Chrysler Corp., Detroit; D. Basch, General Electric Co., Schenectady, N. Y.; A. E. Mervine, assistant general sales manager, New Jersey Zinc Co., New York; C. M. Sorenson, president, Continental Die Casting Corp., Detroit; H. L. Horvill, president, Horvill Aircraft Die Casting Corp., Los Angeles; Thomas E. Coleman, president, Madison-Kipp Corp., Madison, Wis.; Arthur G. Chase, vice president, Precision Casting Co., Syracuse, N. Y.; H. H. Weiss, president, Superior Die Casting Co., Cleveland; J. R. Townsend, Bell Laboratories, Western Electric Co., New York; W. A. Singer, president, Apex Smelting Co., Chicago; Irwin Cornell, vice president, St. Joseph Lead Co., New York; Ernest Scheller, Reynolds Metals Co., Louisville, Ky.

Second Scrap Dealer Agrees To Refund Overcharges

A second firm, said by OPA to have admitted violations of the iron and steel scrap price schedule, has agreed to refund to purchasers all sums collected in excess of the ceiling prices established by OPA. As in the first instance, which involved one of the country's larger brokers and dealers, the latest case likewise has been held anonymous but it was described as a relatively small Pennsylvania dealer.

S. E. Hackett Resigns as Deputy Chief of Iron, Steel Section

S. E. Hackett, deputy chief of the Iron and Steel Branch in the OPM, has resigned due to ill health. Mr. Hackett has been absent from his office for the past several weeks.

Frank Crockard, former president, Woodward Iron Co., Woodward, Ala,. and more recently in the iron and steel division, OPA, has been transferred to the steel expansion unit of the iron and steel branch, OPM.

Louis K. Comstock, electrical engineer and contractor, New York, has been appointed chairman of the board of review set up under the Building Trades Defense Stabilization Agreement. Other members are James Mitchell of the Quartermaster General's office, and Richard Gray, acting president, AFL Building Trades Department.

Trains To Carry Subcontracting Clinic to Manufacturers

Three trains—painted red, white and blue—carrying samples of defense equipment and parts needed, supplemented by blueprints and specifications, to give prospective manufacturers an idea of what the military forces needed will leave

Highlights in the Week's Washington News

Copper use in nonessential products drastically curtailed; OPM seeks to expand domestic, South American production.

Zinc scrap and secondary slab ceiling prices adjusted upward.

Steel and pig iron expansion agreements with six companies authorized by Defense Plant Corp.

Light truck production limitation continued through December.

OPM to increase personnel to 11,000 by Jan. 1; quarters being enlarged.

Priorities Division schedules regional field meetings in six defense manufacturing towns.

Contract Distribution Division, co-operating with military forces, arranges for special trains to carry samples of needed defense materials to prospective manufacturers.

Highway construction preference rating order P-19-e establishes control procedures.

Truck transportation shortage threatened; shippers' co-operation asked.

Zinc dust price advance approved by OPA.

LIGHTER *and Faster . . .* WITH SPEED NUTS

THE FASTEST THING IN FASTENINGS . . .

THE Speed Nut System

PATENTED

. . . answers Weight Reduction Demands

• Every pound saved in aircraft assembly devices assures definite gain in miles per hour.

Amazing as it may seem, the fact is that SPEED NUTS and SPEED CLIPS are saving from 80% to 90% of the former fastening's weight. Think of it! One thousand 8-32 SPEED NUTS weigh a total of only 11 ounces!

What is more, actual aircraft factory vibration tests have proved SPEED NUTS are four times tougher in resistance to vibration-loosening. Time saved in application of SPEED NUTS frequently exceeds 50% and the actual cost per thousand shows savings as high as 70%.

Over 800 shapes and sizes—used on bolts, screws, rivets, studs, tubes, moldings, cables, etc. Send us your assembly details and we will mail samples and engineering data promptly.

TINNERMAN PRODUCTS, INC.

Manufacturers of Patented SPEED NUTS

2039 FULTON ROAD, CLEVELAND, OHIO

IN CANADA:
Wallace Barnes Co., Ltd., Hamilton, Ontario

IN ENGLAND:
Simmonds Aerocessories, Ltd., London

OVER A BILLION IN USE—OVER 800 SHAPES AND SIZES

Washington Nov. 10 for a tour of the country.

The plan was worked out co-operatively by the Army, Navy and Maritime Commission with the OPM Division of Contract Distribution to enlist more manufacturers in defense production. Its purpose will be identical with that of the various defense production clinics held or scheduled in major cities.

One train will travel the eastern seaboard; one will swing through the Middle West; the third will go to the West Coast and return through the South. Each will carry 16 Army officers, nine Navy officers and representatives of the Maritime Commission and eight representatives of the OPM. This personnel will be augmented by local representatives of the services and the OPM.

Manufacturers who wish to gain admission to trains should write to the nearest field office of the OPM Contract Distribution Division, supplying detailed information regarding machine tools and other equipment in their factories.

Definite hours will be assigned to visiting manufacturers to avoid congestion.

Defense production clinics have been scheduled in three major cities for November, as follows: Kansas City, Nov. 7 and 8; Los Angeles, Nov. 17 and 18; San Francisco, Nov. 24 and 25.

Issue New Rating Order For Highway Construction

Preference Rating Order P-19-e, establishing control procedures for the assignment of priority assistance to approved road construction projects, was issued last week by the Priorities Division.

A number of orders granting preference ratings to individual projects have been issued under P-19-a, which provides for extending priority aid to approved defense projects.

The new order sets up a somewhat different approach, whereby the preference rating is extendible in the first instance only by the Public Roads Administration or a state highway department. This is designed to provide control by a responsible public body, and to prevent unwise or unnecessary extensions of the rating.

The Priority Division will issue to the Public Roads Administration, or to a state highway department, the original order extending preference ratings to a road building project, which the administration or department has approved. The preference rating so assigned may be applied to deliveries to a contractor only by action of the department or administration, which will furnish one copy of the order to each of the suppliers with whom the contractor has placed a purchase order for material to the delivery of which the department elects to assign the rating.

A supplier, in order to apply the preference rating to deliveries to him, must execute an acceptance of the order and file it with the Priorities Division, and furnish one additional copy of the order, signed in the same manner, to each of his subsuppliers. The rating will be assigned deliveries, from the first supplier to a contractor, of all material and equipment necessary to a highway construction job, but in the case of orders placed by a supplier with a subsupplier, the rating may be assigned only to materials which will be physically incorporated in the project.

Six classes of favored roads to the construction of which preference ratings may be granted have been listed. They are: Access roads to military and naval establishments, and to defense manufacturing plants; strategic highways; federal-aid roads, and federal-aid secondary, and national park and forest projects. In the last group were included projects for the construction and improvement of the Inter-American Highway, and for the construction of the Trans-Isthmian Highway and the Chorrera-Rio Hato Highway in Panama.

OPM To Enlarge Quarters, Increase Personnel

A large addition to OPM offices is under construction across the street from its present home in the New Social Security building. When completed, it will afford the space necessitated by a rapidly expanding personnel.

It is reported the Priorities Division and the Civilian Supply Division will hire 1000 more employes during the next few months, while statistical, administrative, legal, purchasing and other branches also will be increased. By the first of the year, OPM is expected to have 7500 employes in Washington and 3500 more in field offices.

Announce Personnel of OPM Committees

Appointment of three new members of the Steel Valve Industry Advisory Committee by OPM was announced as follows: M. S. Palmer, Hancock Valve Sales Division, Bridgeport, Conn.; G. A. Daeuble, vice president, Vogt Machinery Co., Louisville, Ky.; M. L. Hough, president, Darling Valve Co., Williamsport, Pa.

At the same time, the appointment of a Turbine and Gears Defense Industry Advisory Committee was announced also. The members include: L. W. Crothaus, Allis-Chalmers Mfg. Co., Milwaukee; F. E. Burkhart, Bethlehem Steel Co., Quincy, Mass.; H. L. Watson, De-Laval Steam Turbine Co., Trenton, N. J.; W. L. Schneider, Falk Corp., Milwaukee; Austin Kuhns, Farrell-Birmingham Co., Buffalo; J. W. Belanger, General Electric Co., Schenectady, N. Y.; and F. D. Newbury, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., with the government presiding officer of the committee, Capt. J. O. Gawne.

Copper Company Granted Loan; RFC Buys Latin American Metal

Jesse Jones, federal loan administrator, has announced the Reconstruction Finance Corp. in connection with the defense program has authorized a loan of $2,500,000 to Bagdad Copper Corp., Hillside, Ariz.

Mr. Jones also announced the Metals Reserve Co. has purchased an additional 96,000 tons of Latin American copper at 11.25 cents per pound c.i.f., New York, for November and December shipment. Anaconda Copper Mining Co. is furnishing 62,000 tons of the copper and Kennecott Copper Corp., the remaining 34,000 tons.

Priorities Division Schedules Regional Field Meetings

Regional meetings to acquaint businessmen with the principles and applications of the priorities system have been scheduled for six cities during November.

John Martin and Mason Manghum of the Washington staff will explain basic policies. Specialists in the various phases of priorities, which most affect the particular region in which the meeting is held, will be in attendance to answer questions. For example, an expert from the Iron and Steel Branch will attend the Pittsburgh meeting.

Cities and dates where the meetings are to be held: Minneapolis, Nov. 3; Cincinnati, Nov. 5; Indianapolis, Nov. 6; Rochester, N. Y., Nov. 11; East Orange, N. J., Nov. 14; Pittsburgh, Nov. 18.

Nearly $7,000,000 More Advanced to Amtorg Corp.

Defense Supplies Corp. has made additional disbursement aggregating $6,889,832.15 to the Russian owned Amtorg Trading Corp. Funds were used to pay for ammunition, guns and other ordnance in the amount of $6,566,044.21, and trucks, trailers and other engineers' items in the amount of $323,787.94.

This makes a total of $36,889,832.15 advanced Amtorg against purchase of Russian manganese, chromite, asbestos and platinum.

OPM Order Drastically Curtails Nonessential Uses of Copper

WASHINGTON

■ USE of copper in a substantial majority of civilian products was virtually prohibited last week in one of the most drastic orders yet issued by the Division of Priorities of the Office of Production Management. The new conservation order is designated M-9-c.

The order, which applies also to imported metal and scrap, requires that the use of copper in a list of more than 100 civilian articles be restricted to approximately 60 per cent of a 1940 base period from now until Jan. 1, 1942, and after Jan. 1, 1942, prohibits use of copper entirely except for certain essential uses in the articles which are named and for non-decorative plating.

After Nov. 1, 1941, no copper will be permitted in building construction and on all items not listed the use of copper is restricted to 70 per cent of a 1940 base period. The order further restricts inventory to a working basis of 60 days and defines copper and copper alloy as any metal containing 50 per cent of copper.

The prohibited list includes seven general categories: Building supplies and hardware, house furnishings and equipment, dress accessories, jewelry, gifts and novelties, burial equipment, automobiles, trailer and tractor equipment and a miscellaneous list which ranges from fire fighting apparatus to toys from beer dispensing equipment to match plates.

Lists Seven Exceptions

Seven specific exceptions are made. Restrictions do not apply to Army, Navy, lend-lease, or other government defense agents and contracts where copper is specified, nor to products covered by underwriter or other safety regulations already in effect on Oct. 1, nor to copper used as a conductor of electricity; in chemical plants where corrosive action requires use of copper alone, and in research laboratories; for condenser or heating exchanger tubes and tube sheets in steam generator plants and oil refineries where corrosive action prohibits use of other materials, and in hydroelectric plants.

Explanation for the drastic order was the shortage already apparent and the anticipated demand as of October, 1941. Army, Navy, lend-lease and other primary defense agency demands for October total 144,430 short tons, and total demand, including civilian, is put at 259,479 tons, while total October production, domestic, foreign and scrap, is given as 138,700 tons.

Estimates for 1942 show a continuing serious situation, according to OPM, which stated that supply, including approximately 600,000 tons from imported ores subject to shipping hazards, is seen at 1,650,000 tons.

Total demand is estimated at 2,400,000 tons, including 1,050,000 tons for defense, 250,000 tons for civilian requirements, and 1,100,000 tons for other civilian needs. Thus a shortage of 750,000 tons is indicated for 1942.

Seek To Expand Output

OPM stated that every effort to expand supply is being made but an additional 10 per cent to the 1,000,000 tons to be produced domestically in 1942 is about the expected limit of extra supplies. Of the bulk of the imported copper, approximately 80 per cent will come from Chile, it is anticipated, with other imports from Peru, Venezuela, Cuba, Philippines, and Canada. Chilean production is increasing steadily each month and any large increase in supply, it is stated, probably will come from South America where potential copper producing areas remain unexplored. Principal defense requirements for copper are for manufacture of brass for shell casings, wire and cable for electric transmission lines and for various maritime uses for prevention of salt water corrosion. Shell casings alone will absorb one-third of the 1942 supply.

The order contains prohibition against sales or deliveries of copper or copper base alloy to any person in violation of terms of the order.

The provision in the order limiting inventories reads: "No manufacturer shall accumulate an inventory of copper or copper base alloy or products thereof in the form of raw materials, semi-processed materials, finished parts, or subassemblies in quantities in excess of a minimum of practicable working inventories, taking into consideration the limitations placed upon the production of copper products by this order. A minimum practicable working inventory shall in no event exceed that amount of material necessary to maintain operations for 60 days. Any manufacturer who has an inventory in excess of a minimum practicable working inventory is prohibited from receiving additional copper or copper base alloy or products thereof beyond the extent necessary to maintain such minimum practicable inventory."

Zinc Scrap, Secondary Slab Ceiling Prices Adjusted Upward

Zinc scrap and secondary slab zinc prices have been adjusted upward, all scrap prices placed on a shipping point basis, and premiums established for scrap shipments in quantity in an amendment to Price Schedule No. 3, issued by OPA.

Increases in the scrap and secondary metal ceilings reflect the advance from 7.25 cents to 8.25 cents a pound in the price of primary zinc allowed recently by OPA.

Administrator Henderson pointed out that, with the current revision, all OPA price schedules for nonferrous scrap metals use the f.o.b. shipping point basis. All purchasers of scrap, wherever located, thus are afforded an equal opportunity to compete for supplies. This was not always possible when ceiling prices were on a "delivered" basis, because of the difference in transportation costs.

As revised, the schedule sets up maximum prices per pound for the various grades of scrap as follows:

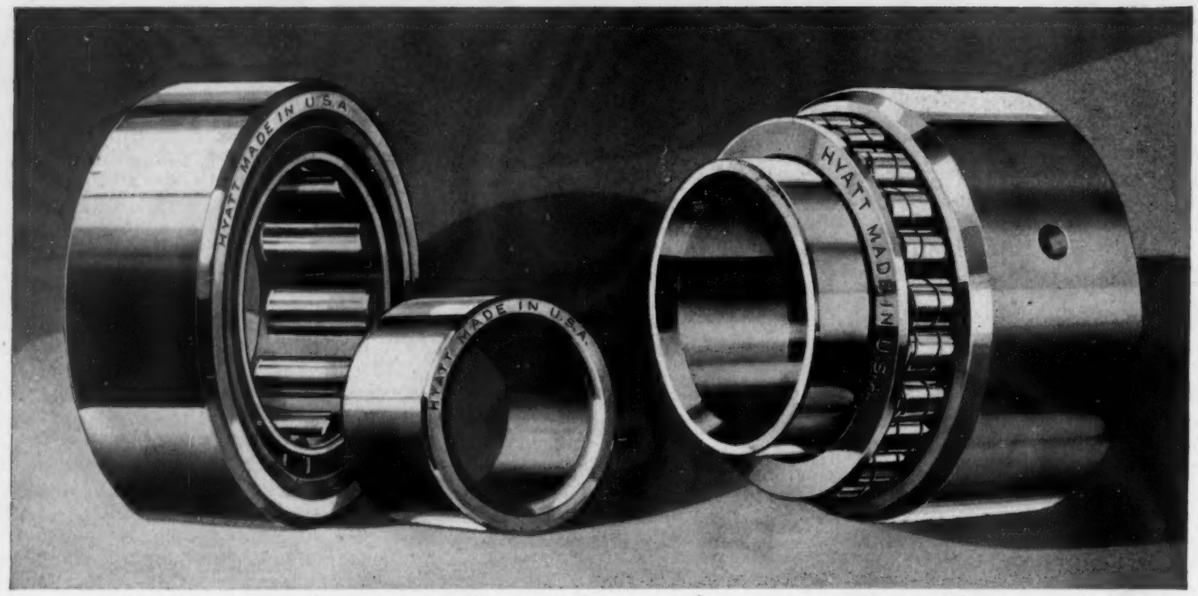
New zinc clippings, trimmings	7.25c
Engravers', lithographers' plates	7.25c
Old zinc scrap	5.75c
Unsweated zinc dross	5.80c
Die cast slab	5.80c
New die cast scrap	4.95c
Radiator grilles, old and new	4.95c
Old die cast scrap	4.50c

To these maximums, the schedule provides, may be added a premium of ½-cent a pound on any shipment at one time of 10,000 pounds or more of new zinc clippings and trimmings, engravers' and lithographers' plates, and old zinc scrap, or any combination of the three. A similar ½-cent premium is permitted for any shipment at one time of 20,000 pounds or more of new or old die cast scrap and radiator grilles, in any combination thereof. No premiums for quantity shipments are provided for galvanizers' dross or die cast slab.

Maximum prices of the several grades of secondary slab zinc are advanced a flat 1-cent a pound by the amendment. The base delivered price is established at 8.25 cents a pound for Prime Western or poorer grade, plus carload freight from East St. Louis to the buyer's customary rail receiving point.

■ Commercial steel castings production in August, 117,703 net tons, compared with 112,364 tons in July and 66,355 tons in August, 1940, according to Bureau of the Census. The industry operated at 100.6 per cent of capacity in August. Production for eight months this year aggregated 826,089 tons, compared with 482,885 tons in the period last year.

KEEP THEM YOUNG WITH HYATTS



ALL THE WAY THROUGH—from our exacting steel specifications, positive controlled heat treating, exclusive precision grinding methods, unrelenting process and finished product inspections—quality is built into Hyatt Roller Bearings to make them perform so well and so long. Are you enjoying the advantages of Hyatt Quality?

Tell us when and where we can serve you. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, N.J., Chicago, Pittsburgh, Detroit, San Francisco

HYATT

ROLLER BEARINGS

QUIET

Mirrors of *MOTORDOM*

Union officials say employe morale can be bolstered only by cutting labor in with management and government on production planning. Visualize super-boards regulating operations of all industries. Charge managements with failing to anticipate impacts of defense program on equipment needs and employment. Bonus asked for swing-shift operations. Draw up pattern for transfer of men to defense plants

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ RESENTMENT against organized labor, springing out of the current wave of jurisdictional strikes and tieups in defense plants is at a high pitch, but it is perhaps not altogether fair and just to indict labor unions for their actions without giving them a chance to express their views. Here, then, is a summary of a studied analysis of current problems coming from high councils of the United Automobile Workers, CIO, and representing the official opinion of this organization:

In the first place, strikes in defense plants are inexcusable Union officials are quick to admit their share of mistakes in policy and they say that while it is possible to "explain" such strikes, it is impossible to condone them. In most cases they represent the ill-advised actions of local leaders usurping the authority of international officers. The problem here is one of instilling respect for constituted authority, not yet licked by the CIO.

In a sense, strikes in defense plants grow out of the fact that striking workmen fail to appreciate the urgency of the manufacturing program; in other words they have not acquired the proper "defense morale." Morale of this sort is a difficult thing to build into working forces. Union leaders say it cannot be bought with wage increases, but can be achieved only by taking labor into partnership with management and government.

Want Permanent Boards

This partnership idea is the gist of the Murray plan conceived for the steel industry and the super-boards for production planning proposed in other industries. Labor wants its representatives to sit around a common table with industry and government to supervise the entire production effort in a single industry. Such a super-board would allocate certain phases of production to this plant, others to that plant, with the hope of effecting maximum utilization of all equipment and personnel.

And these boards are proposed as no emergency measure by labor. They are seen as permanent institutions, guaranteeing for labor in the future equal representation with management in planning production. Call it collectivization of industry, sovietizing industry, or what you will, unions are squarely behind this idea and are pushing it aggressively.

When it is suggested that the OPM, SPAB and other defense agencies are just such super-boards as labor envisages, the reply is made that they do not have the authority which labor's boards would have. There is the key—authority and power, beyond the mere right to strike over wages and working conditions.

Labor is more than a little miffed over the cool treatment accorded some of its suggestions such as the Reuther plan for conversion of automobile plants to warplane production. They feel that Mr. Knudsen gave them the "fast brush" after this plan was submitted to him last winter, and they are still talking for more serious consideration of the suggestions made then for building 500 planes a day in present automobile plants.

"Studies" which the UAW-CIO has made through its members in automobile plants have led to the conclusion that 90 per cent of the present machine tools and related equipment in auto plants could be used in production of guns, tanks, planes and other defense *materiel*. Labor maintains the basic types of machines—lathes, grinders, milling machines, screw machines, Bullards and Keller machines—are the same in both defense and auto plants, that the conversion is only a matter of tooling.

They point to such things as the refusal to locate the Buick airplane engine plant in Flint because of fears that a labor shortage would prevent adequate staffing of the plant there, while now there is danger of 40,000 men being out of work in the Flint area in the next few months because of curtailment of automobile production. The UAW claims it knew right along this unemployment would be sufficient to staff new defense plants, but that management pulled a boner by refusing to recognize that "production as usual" would have to give way to a greatly accelerated defense program.

How Much Equipment Can Be Transferred to Defense?

This figure which the UAW has worked out—90 per cent of present machines in auto plants O.K. for defense plants—is interesting because it contrasts with a figure of only 15 per cent which is the estimate made by management. In fact, the reason so many new defense plants have been built is that so little of the present equipment was considered suitable for use on defense work. Somewhere between the 15 per cent and the 90 per cent lies the actual figure.

Labor is guilty of a gross oversimplification of the adaptability of machine tool equipment to manufacturing. Mere availability of a certain basic type of machine is no indication it can be transferred right over to defense work. On the other hand, management is probably guilty of underestimating the amount of machinery suitable for defense, the reason being that the size and extent of the defense effort is continually growing. If consumer goods manufacturing is to be curtailed to a mere trickle, and the defense program upped to the dreamy regions of $100,000 000,000, then obviously more utilization of present

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equipment can be effected. But no one, not even the UAW-CIO, could see this coming a year ago.

Idle Machines Await Only Contracts To Start

Latest survey which the UAW-CIO has culled, to show the laxity of the defense effort, covers 34 Detroit automobile plants in which 1577 machine tools are operated. Fathered by the Wayne County Tool, Die and Engineering Council, the survey shows that 337 of the above machines are idle throughout the week, that the remainder are being operated at an average of 70.4 hours per week. With capacity operations on this equipment, using a 160-hour week as the basis for figuring, total weekly operation would reach 252,320 machine hours. Actual machine hours are about 87,296, or 35 per cent of capacity.

The answer is perfectly simple. If the contracts were there, the machines would be operated. But defense work just cannot be released in sufficient volume or in time to run these plants on a swing-shift basis of 160 hours a week. Once the contracts are released, the co-ordination of the equipment can be effected by the normal path of subcontracting and farming-out. There would appear small need for any new and untried super-board to wind more red tape around production.

Assuming the necessary volume of work available for such peak operations, would the UAW-CIO agree to swing-shift operations of employes at prevailing rates, with no increases where Saturday and Sunday work was involved? The answer is NO. The union believes the swing-shift eventually may become practical in certain isolated plants, in which case the added effect of time-and-a-half pay for Saturday and double-time for Sunday work should be applied to the basic hourly rate, so that workmen whose normal routine has been upset by having to work daytime, afternoon and night shifts in rotation will have a compensating bonus.

Ease Path of Transfer to Defense Employment

Before any general adoption of swing shifts must come the absorption of thousands laid off in auto plants into defense work. The industry pattern for policies governing transfer of men to defense plants has been perfected by General Motors, working in conjunction with the OPM and the UAW. Seven points are included in the official interpretation of the policies:

1. Where a man working on nondefense production is laid off and obtains defense employment with another company, and that fact is certified to his former employer, he will not have to report back for nondefense production work in order to protect his seniority so long as he retains the defense employment to which he was certified.

2. Transfer of employes from nondefense to defense work in each local bargaining unit shall be in line with agreements regarding the transfer of employes. Employes fully qualified for skilled and semiskilled jobs on the basis of past experience and training shall be transferred in line with their seniority.

3. When hiring new employes for defense work, qualified applicants out of work on account of authorized government curtailment of nondefense production, or employes working on nondefense production in local industry where they can be spared or loaned, and where curtailment in their industry is authorized for the near future, will be given preference based upon length of experience in the industry.

4. Skilled tradesmen, partially employed, or employed at occupations other than their trade or its equivalent in defense usefulness, will be released upon their request, with protection of their seniority rights, for full-time defense work (40 hours a week) at their trade.

5. These provisions became operative Oct. 2 and were not retroactive except that provisions dealing with the protection of an employe's previously established seniority status were retroactive to Sept. 17.

6. An employe loaned or laid off, whether unemployed or currently employed on defense or nondefense work, must report back for defense employment to the company with which he holds his original seniority for work in the same community, if and when called, on notice of at least one week. Defense training is to be considered defense employment, provided there is an understanding between employer and employe that the latter is being trained for a specific payroll job.

7. Claims of discrimination by individual employes arising out of these provisions may be reviewed by the shop committee with the local plant management, but shall not be subject to further appeal.

The regulations are based on four fundamental aims: To expedite the defense program; to improve employe morale by fair treatment; to reduce migration of workmen between plants and communities; and to provide a simple and readily understood interpretation of job transfers.

Despite full unionization of the Ford plant, along with the checkoff system, production there has been beset with almost constant difficulties in the form of slowdowns, threatened walkouts, minor fights and the like. Why such a situation should prevail is something for union officials to answer. They have indicated that difficulties of this sort are always experienced with unionization of a plant and that until the changed relationships of employes and supervisory personnel are fully appreciated, minor disturbances can be expected. They add that the situation is aggravated by the fact some Ford officials at heart are still violently opposed to the union.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,895
Aug.	103,343	89,866	164,792
8 mos.	2,377,691	2,875,477	3,782,440
Sept.	192,679	284,583	.....
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

Week ended:	1941	1940†
Sept. 27	78,535	95,990
Oct. 4	76,820	105,153
Oct. 11	79,065	107,957
Oct. 18	85,600	114,672
Oct. 25	91,855	117,080

†Comparable week.

Recruiting 2000 Workers For New Defense Plant

■ An "industrial recruiting office" was opened by Westinghouse Electric & Mfg. Co. to fill 2000 defense jobs in its new South Philadelphia works at Lester, Pa.

The 6000 men and women in the present plant force were asked by Westinghouse "to find the persons you would like to have working next to you." The employes received handbills as they came to work, requesting them to represent the company in their communities.

Equipment for the navy and merchant marine is being manufactured in the plant. A new building, which will require 2000 workmen, is being built by Westinghouse at Lester to produce machinery for merchantships. New student-employes will be paid to learn manufacturing jobs.

Give Nasmyth Sketches To Chambersburg Co.

■ Chambersburg Engineering Co., Chambersburg, Pa., recently was presented the original wash drawing of Nasmyth's patent steam hammer, dated Jan. 4, 1844, by the Institution of Mechanical Engineers, St. James' Park, London, England. Two other original drawings of Nasmyth machinery were also presented.

CUT 9 OPERATIONS TO 1 WITH TOCCO HARDENING

(Total Time: 58 seconds)

FORMER HEAT TREATING SCHEDULE

1. Haul
2. Copper plate
3. Haul
4. Remove copper
5. Haul
6. Pack
7. Carburize and harden (8 hours)
8. Haul
9. Straighten

Here's another manufacturer who has speeded up Defense production — cut *nine* operations to *one* and increased strength of the product with TOCCO Hardening.

The part — outboard motor crankshaft. Formerly made of S.A.E. 1020 steel carburized and hardened. *8-hour cycle.* Schedule of operations is shown above.

Now, with TOCCO Hardening they use S.A.E. 1050 steel, resulting in stronger shafts. One speedy operation (TOCCO Jr. in machining line) cuts former hours to *58 seconds* hardening time. Saves 25% to 50% in cost. Conserves floor space. Improves working conditions by eliminating furnace heat.

Ask about the TOCCO Process for hardening and for heating for annealing, brazing, soldering, forming or forging. Free book on request.

Photo and data courtesy of Evinrude Div., Outboard Marine & Mfg. Co., Milwaukee, Wisc.

THE OHIO CRANKSHAFT COMPANY
CLEVELAND, OHIO

TOCCO

World's fastest, most accurate heat-treating process.

MEN of INDUSTRY

■ **ROBERT H. BAHNEY** has been promoted from chief engineer, Central Alloy district of Republic Steel Corp., Canton, O., to assistant chief engineer for the corporation, with headquarters in Cleveland. **Eugene W. Phillips** succeeds Mr. Bahney as Central Alloy district engineer.

♦

R. I. Parker has been named assistant district manager, Central district, General Electric Co., Chicago.

♦

A. R. Morse has been placed in charge of the Cleveland office of Reed-Prentice Corp., Worcester, Mass., manufacturer of machine tools.

♦

John R. Keeler, formerly associated with International Smelting & Refining Co., has joined the technical staff of Battelle Memorial Institute, Columbus, O.

♦

C. C. Swift, since 1911 secretary and treasurer, Ohio Machine Tool Co., Kenton, O., has been elected president. He succeeds the late Walter D. Sayle.

♦

W. L. Calhoun, of Atlanta, Ga., who has been associated with the Vari-Typer Co., New York, in a sales capacity since 1939, has been appointed southeastern district supervisor, with headquarters in Atlanta.

♦

J. F. Eckel, since 1939 co-ordinator of manufacturing activities, refrigerator department, General Electric Co., Schenectady, N. Y., has been appointed supervisor of the company's subcontracting program.

J. F. Eckel

R. H. Bahney

C. C. Swift

♦

R. M. Cundiff has been named manager, Cincinnati branch office, Bailey Meter Co., Cleveland, with headquarters at 2512 Carew Tower building. He succeeds **E. R. Dearborn,** resigned. The past 12 years Mr. Cundiff has been located in the company's New York branch office.

♦

R. A. DeVlieg, formerly general works manager, Nash Motors Division, Nash-Kelvinator Corp., Kenosha, Wis., has been elected vice president in charge of all Wisconsin operations. **N. E. Wahlberg,** vice president, will head up a newly formed engineering research division, and associated with Mr. Wahlberg will be **Meade Moore,** as chief research engineer. **Floyd Kishline** will succeed Mr. Moore as chief engineer. These changes become effective Nov. 1.

♦

W. B. Simons, Charlotte, N. C., has been appointed representative in North and South Carolina by Cochrane Corp., Philadelphia, for its line of flow meters.

♦

N. F. S. Russell, president, United States Pipe & Foundry Co., Burlington, N. J., has been elected a director, Cramp Shipbuilding Co., Philadelphia.

♦

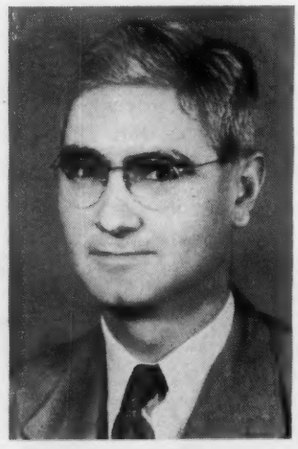
Charles J. Slunder has been named to the research staff, electrochemical division, Battelle Memorial Institute, Columbus, O. He formerly was associated with Aluminum Co. of America.

♦

W. B. Simmons has been promoted to assistant superintendent, La Crosse division, Chicago, Burlington & Quincy railroad, with headquarters in Daytons Bluff, Minn. He succeeds **J. E. Carroll,** who has been granted a leave of absence.

♦

Dr. Elmer K. Bolton, chemical director, E. I. du Pont de Nemours & Co., will be presented with the Chemical Industry medal of the Society of Chemical Industry at a joint meeting of the American Section of the society, the New York section of the American Chemical Society and the New York section of the American Institute of Chemi-



R. M. Cundiff

cal Engineers, Nov. 7 in New York. The medal is awarded for valuable application of chemical research to industry.

♦

James P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., and past president of the American Society for Metals, has been appointed to the advisory committee on metals and minerals to the National Academy of Science and National Research Council.

♦

Harlan A. Messner has been appointed sales engineer, Ohio Crankshaft Co., Cleveland, and has been transferred to the West coast to head district sales and service of electrical induction surface hardening and heating equipment. His headquarters are at 118½ South Flores, Los Angeles.

♦

Dwight J. Shelton, since 1927 vice president, Marion Steam Shovel Co., Marion, O., has been named president and general manager, succeeding **J. H. Watters,** who has resigned to become president, Union Asbestos & Rubber Co., Chicago. **Alex Gibson** has been made vice president to succeed Mr. Shelton.

♦

Harold Vagtborg, director, Armour Research Foundation, Illinois Institute of Technology, Chicago, has been named director also of the school's newly established Institute of Gas Technology. **Dr. Lincoln Thiesmeyer,** geologist, has been appointed to the staff of the Gas Institute as geologist and student advisor.

♦

R. M. Roberts, formerly assistant general manager of packers can sales, American Can Co., has been named manager of sales of the newly established Atlantic division, New York, with **H. H. Howry** as assistant manager. **H. A. Pinney** has been made manager of the new Central division at Chicago, with **L. W. Graaskamp** as his assistant. **J. J. Lynch** has been appointed assistant to the vice president, in charge of the Central division.

♦

M. L. Patterson, recently in charge of the federal department, Sperry Gyroscope Co. Inc., New York, has been named general sales manager, taking over duties formerly administered by **R. B. Lea,** who continues as vice president in charge of sales. **E. C. Sparling,** assistant chief engineer, will take over the duties of chief engineer from **P. R. Bassett,** who as vice president in charge of engineering, will retain executive direction of all engineering matters.

♦

Dr. Arthur N. Talbot, professor emeritus, University of Illinois, Champaign, Ill., was honored by the American Railway Engineering Association, Oct. 21, when a bronze tablet bearing his name and recognizing his nearly 30 years of research work for railroads, was presented to the university for erection in the laboratory bearing his name. The occasion marked the retirement of Dr. Talbot as chairman of the association's special committee on stresses in railroad track.

♦

Don Mack, advertising director, Weber Showcase & Fixture Co., Los Angeles, has been elected president, Industrial Marketers of Southern California, the Los Angeles chapter of the National Industrial Advertisers Association. Other officers elected to serve with Mr. Mack are: Vice president, **Robert Koch,** advertising manager, Vapor Recovery Systems Co., Compton, Calif., and **Dave Browne,** secretary-treasurer.

♦

Charles F. Lumm, formerly associated with Byerlyte Corp., Newark, O., has joined Battelle Memorial Institute, Columbus, O., where he has been assigned to the division of ceramic research.

♦

W. R. McConnell, formerly director of purchases, Aluminum Co. of Canada and its affiliated companies, is now associated with Tube Reducing Corp., Wallington, N. J., as assistant to the president.

♦

Frank Liebert has been named product manager of the bag and envelope division, Reynolds Metals Co., Richmond, Va., succeeding **V. W. Moody Sr.,** who has been transferred to Louisville, Ky., as manager of the company's new powder container plant. Mr. Liebert was formerly assistant to Mr. Moody.

Congress of Industry To Meet in New York, Dec. 1-5

■ Congress of American Industry will hold its annual meeting at the Waldorf Astoria hotel, New York, Dec. 1-5, it was reported last week by Walter D. Fuller, president, National Association of Manufacturers.

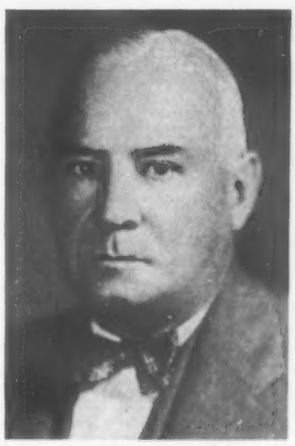
Theme of the congress, said Mr. Fuller, will be the opening lines of the preamble to the constitution, "To Secure the Blessings of Liberty." Army, Navy and defense officials head the list of scheduled speakers. Donald M. Nelson, executive director, SPAB; William S. Knudsen, director general, OPM; Leon Henderson, price administrator, will participate in the first day's sessions.

National Industrial Council, sponsored by NAM, will convene Dec. 1-2. Formal opening sessions of the Congress of American Industry Dec. 3, will outline pattern of discussion for the remainder of the meeting.

DIED:

■ **Allyn Fitch Harvey,** 70, former president, Pittsburgh Steamship Co., Cleveland, at his home in Bratenahl, O., Oct. 22.

Mr. Harvey had been active in Lake shipping circles for nearly half a century. A graduate of Yale University, he joined Pickands, Mather & Co., Cleveland, in 1894. In 1901 he went to Duluth as assistant to the general manager of Pittsburgh Steamship Co. and returned to Cleveland two years later when the company moved its headquarters to that city. He was elected a vice president in 1916 and president in 1924. He retired in December, 1940, due to ill health.



Allyn Fitch Harvey

Mr. Harvey was chairman of the Lake Carriers Association in 1930, and was the oldest living associate member of the Shipmasters Association.

♦

George Britton Durell, 79, chairman of the board, American Fork & Hoe Co., Cleveland, at his home in Cleveland Heights, O., Oct. 21. Prior to joining American Fork & Hoe in 1905 as treasurer, Mr. Durell was president, Harriman Hoe & Tool Co., Harriman, Tenn., and before that general manager, Chattanooga Hoe & Tool Co., Chattanooga, Tenn.

♦

Edward Whitehead, 76, chairman, Whitehead Bros. Co., New York, Oct. 18, at his home at South River, N. J.

♦

Oscar V. Strand, 68, a partner in N. A. Strand & Co., Chicago, manufacturer of flexible shafts, in that city, Oct. 17.

♦

William F. McAfee, 63, assistant to the president, International Harvester Co., Chicago, in charge of the company's national defense work, Oct. 17, in Washington.

Quartermaster Corps Plans Maximum Distribution of Army Defense Orders

■ ARMY'S Quartermaster Corps will spread as widely as possible future orders for defense supplies, material and equipment it procures for the War Department, it was reported last week. This will be done to distribute work among the maximum number of firms and to allocate orders on a geographical basis. Prices, it is said, will no longer be dominant in making awards.

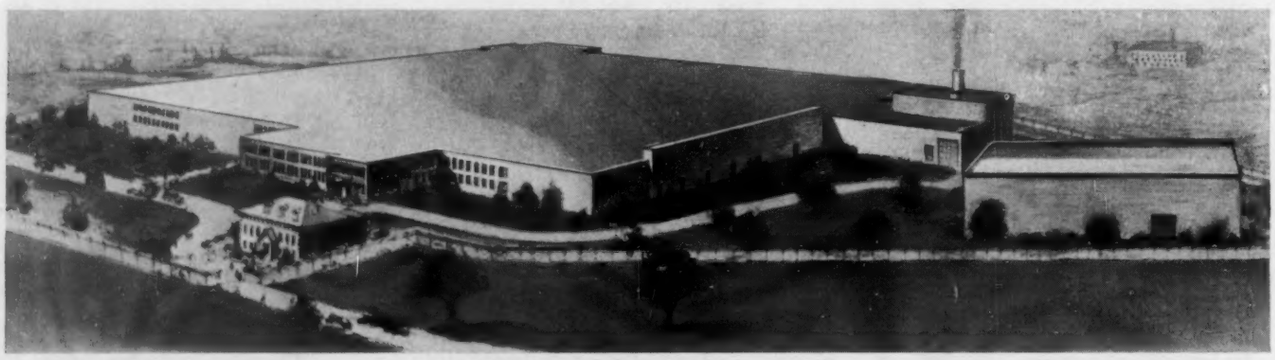
Quantities placed with any bidder will be limited, and circumstances governing individual bids will be considered. Direct negotiations will be resorted to when prices offered appear too high.

War Department's awards reported last week totaled $20,786,913. Most orders again were small and widely distributed among various branches of the army. They included:

Ordnance Department Awards

Allegheny Ludlum Steel Corp., Brackenridge, Pa., gages, $6160.
American Brass Co., Waterbury, Conn., brass, $1,047,199.
American Manganese Bronze Co., Philadelphia, manganese bronze, $13,882.08.
American Type Founders Inc., Elizabeth, N. J., guns, $3,995,850.
Barbour-Stockwell Co., Cambridge, Mass., iron castings, $1792.
Barcalo Mfg. Co., Buffalo, wrenches, $4734.
Barnes, W. F. & John, Co., Rockford, Ill., shot, $4,000,000.
Bausch Machine Tool Co., Springfield, Mass., screw tapping machines, with spindles, $3321.
Bellevue Industrial Furnace Co., Detroit, furnaces, $8118.
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., spare parts for pilot transmission system, $4915.
Bliss & Laughlin Inc., Harvey, Ill., steel, $10,799.31.
Carnegie-Illinois Steel Corp., Pittsburgh, steel, $10,543.49.
Carpenter Steel Co., Reading, Pa., drill rods, $2368.
Cincinnati Electrical Tool Co., Cincinnati, pedestal grinders, $1500.
Cincinnati Milling Machine Co., Cincinnati, milling machines, $4179.
Clark Tructractor, Battle Creek, Mich., utilitrucs, $7760.
Colonial Broach Co., Detroit, broaches and serration drifts, $4451.
Cutler-Hammer Inc., Boston, parts for drum controller, $2306.
Dana Tool-D Nast Machinery Co., Philadelphia, saws, twist drills and taps. $8020.
Disston, Henry, & Son Inc., Philadelphia, steel plate, $8551.20.
Doehler Die Casting Co., Pottstown, Pa., booster cups, $5593.
Electric Arc Cutting & Welding Co., Newark, N. J., parts for generating units. $2120.75.
Electric Household Utilities Corp., Hurley Machine Division, Cicero, Ill., boosters, $854,199.
Erickson, C. E., Co. Inc., Des Moines, Iowa, cartridge cases, tools, punches, dies and gages, $217,796.18.
Essex Specialty Co. Inc., Berkeley Heights, N. J., flares, $575,400.
Federal Products Corp., Providence, R. I., gages, $9310.
Federal Tool Corp., Chicago, gages, $5328.
Firth-Sterling Steel Co., McKeesport, Pa., dies, $1908.
Florence Stove Co., Gardner, Mass., ammunition boxes, $370,000.
Ford Motor Co., Dearborn, Mich., brake assemblies, $6440.70.
Franklin Electric Co., Philadelphia, wire, fuses, and clamps, $2716.
Gairing Tool Co., Detroit, reamers, $1780.
General Motors Sales Corp., New Departure Division, Bristol, Conn., ball bearings, $7078.
Genesee Tool Co., Fenton, Mich., cutting tools, $4267.
Gorton, George, Machine Co., Racine, Wis., duplicators, $3708.
Goss & DeLeeuw Machine Co., New Britain, Conn., threading attachments, and chucks, $37,750.
Great Lakes Steel Corp., Detroit, steel, $8499.09.
Greenfield Tap & Die Corp., Greenfield, Mass., gages, $2014.08.
Hannifin Mfg. Co., Chicago, recoil mechanisms, $396,274.
Hardinge Bros. Inc., Elmira, N. Y., collets, and collet sleeve and adapter assemblies, $3142.
Heim Co., Fairfield, Conn., polishing machines, $6882.
Hesse Machine & Mfg. Co. Inc., Boston, gages, $9056.
High Speed Hammer Co., Rochester, N. Y., spinning machines, $6015.
High Standard Mfg. Co., New Haven, Conn., guns, $6,755,791.
JCH Automatic Machine Works, Philadelphia, knurls, $2475.
Jones & Laughlin Steel Corp., Pittsburgh, steel, $8113.
Kilgore Mfg. Co., International Flare-Signal Division, Tipp City, O., flares, $16,082.
Lincoln Electric Co., Cleveland, welding machines, $4215.
Lincoln Park Tool & Gage Co., Lincoln Park, Mich., gages, $2875.84.
Link Belt Co., Chicago, carriage and recoil mechanism, $286,200.
Linley Bros. Co., Bridgeport, Conn., milling and jig boring machines, $29,315.
Magnus Tool & Die Co., Newark, N. J., punches, $5405.
Manville, E. J., Machine Co., Waterbury, Conn., cold headers, punches and dies, $18,607.
McGann, T. F., & Sons Co., Boston, bronze castings, $1350.
McGonegal Mfg. Co., East Rutherford, N. J., grinders with spindles and motor bearings, $2567.
Mechanical Laboratories Inc., Pittsburgh, gages, $1548.
Metal Goods Corp., St. Louis, brass and copper tubing, $2620.24.
Micromatic Hone Corp., Detroit, honing tools and micromatic shells, $41,952.
Midwest Tool & Mfg. Co., Detroit, cutting tools, $1546.20.
Miller Co., Meriden, Conn., brass, $12,522.
Milwaukee Gas Specialty Co., Milwaukee, fuzes, $249,993.
Mohawk Machine & Tool Co., New York, gages, $1680.
Morgan Machine Co., Rochester, N. Y., nailing machines, $9525.
Morris Truck & Wheel Co. Inc., Philadelphia, trucks, $3450.
Morton Mfg. Co., Chicago, ammunition chests, $62,181.
National Cash Register Co., Dayton, O., fuzes, $658,050.
National Twist Drill & Tool Co., Detroit,

Allis-Chalmers To Build $9,000,000 "Blackout" Supercharger Plant



■ In anticipation of receiving confirming orders from Washington within a few days, crews began clearing ground last week for this $9,000,000 supercharger plant for Allis-Chalmers Mfg. Co. Completion, to be in six months, will give Milwaukee its first real blackout factory.

Soon after, the 500 x 800-foot single floor building will be ready to house facilities for making the mechanism that, along with the United States bombsight, has been described as potentially one of the most decisive weapons of war. A force of 3000 will man the streamlined, windowless plant, working night and day.

Allis-Chalmers now is engaged in producing nearly $100,000,000 in defense materials. To its long list it will add soon the turbosupercharger.

steel drills, $1862.
Newark Gear Cutting Machine Co., Newark, N. J., gear hobbing machines, $36,804.
Newman-Crosby Steel Corp., New York, steel, $27,820.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., machine tools, $463,633.
Norton Co., Worcester, Mass., grinding wheels, $3746.66.
Nunn Mfg. Co., Evanston, Ill., shells, $91,780.
Otis Steel Co., Cleveland, steel, $2712.86.
Pipe Machinery Co., Cleveland, gages, $3047.
Pittsburgh Plate Glass Co., Milwaukee, primers, $5100.
Pullman Standard Car Mfg. Co., Chicago, suspension wheels, $2196.25.
Revere Copper & Brass Inc., Baltimore, cartridge brass clippings, copper, $447,-022.
Reynolds Metals Co., Louisville, Ky., rods, $5321.
Rheem Mfg. Co., Chicago, fin assemblies $112,500.
Riverside Metal Co., Riverside, N. J., bronze bars, $1767.
Ryerson, Joseph T., & Son Inc., Chicago, steel, $2184.27.
Sall, George, Metals Co., Philadelphia, lead, $1682.
Samson-United Corp., Rochester, N. Y., anvils and strikers, $63,750.
Savage Tool Co., Minneapolis, grinding machines, $10,900.
Schollhorn, William, Co., New Haven, Conn., pliers, $23,647.
Scovill Mfg. Co., Waterbury, Conn., cartridge cases, fuzes, $402,620.
Sheip, Henry H., Mfg. Co., Philadelphia, chests, $2996.
St. Pierre Chain Corp., Worcester, Mass., forgings, $71,758.
Standard Gage Co. Inc., Poughkeepsie, N. Y., gages, $2073.
Sterling Engine Co., Buffalo, N. Y., generator sets, $34,738.08.
Smith-Foley Co., Philadelphia, boring bars and collars, $2175.
Suburban-Essex Machinists Inc., Orange, N. J., gages, $4717.
Summerill Tubing Co., Bridgeport, Pa., steel tubing, $38,511.80.
Surface Combustion Corp., Toledo, O., temperature controls for furnaces, $4232.
Thomas Steel Co., Warren, O., steel, $2149.
Thompson Wire Co., Boston, steel, $32,045.45.
Thomson-Gibb Electric Welding Co., Lynn, Mass., dial stands, $1816.
Timken Detroit Axle Co., Wisconsin Axle Division, Oshkosh, Wis., parts for tanks, gears, $1,256,508.95.
Titeflex Metal Hose Co., Newark, N. J., tubes for tanks, $5622.
Tobin-Arp Mfg. Co., Minneapolis, boring machines, $29,808.
Tools & Gages Inc., Cleveland, gages $5448.
Triad Tool & Die Co., Newark, N. J., punches and wrenches, $2695.
Triplex Machine Tool Corp., New York, hydraulic press, $1900.
Underwood Elliott Fisher Co., Hartford, Conn., parts for primers, $48,830.
United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., flanges for tanks, $2326.
U. S. Electrical Motors Inc., Milford, Conn., geared head motors, $1901.
U. S. Tool Co. Inc., Ampere, N. J., milling machines, $7390.
Van Norman Machine Tool Co., Springfield, Mass., boring machines and tool bits, $14,842.
Veit & Young, Philadelphia, spindles, $1650.
Vinco Corp., Detroit, gages, $1650.
Wallace Supplies Mfg. Co., Chicago, forming and cutting rectangular tubing, $17,378.40.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., headers and accessories, $17,956.
Watson-Stillman Co., Roselle, N. J., assemblies, springs, punches, noses, $10,-114.
Western Cartridge Co., East Alton, Ill., cartridges, $6202.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., stokers, $6191.
Westinghouse Electric Supply Co., Philadelphia, conduit, couplings, $1472.
Wiedemann Machine Co., Philadelphia, gages, $8870.
Willys-Overland Motors Inc., Toledo, O., shells, $5,078,370.
Wood, John, Mfg. Co. Inc., Chicago, cartridge cases, $107,280.
Zimmerman Steel Co., Bettendorf, Iowa, steel, $102,456.78.

Corps of Engineers Awards

Anderson, Dorsey C., Philadelphia, electric welders, $2124.80.
Bethlehem Steel Co., Bethlehem, Pa., turnouts, rails, splice bars, bolts, ties and rail clamps, $51,332.64.
Briggs-Weaver Machinery Co., Dallas, Tex., metal shaper, with standard equipment, aircraft assembly plant, Ft. Worth, Tex., $8500.
Brown & Root Inc., New Orleans, natural gas transmission line, Keesler field, Biloxi, Miss., $52,927.
Brown & Sharpe Mfg. Co., Providence, R. I., automatic screw machines with regular equipment accessories, aircraft assembly plant, Ft. Worth, Tex., $12,-460.58.
Bryant Machine & Engineering Co., Chicago, jig boring machines and accessories, aircraft and assembly plant, Ft. Worth, Tex., $9006.
Buller, P. B., Co., Omaha, Nebr., rivet coolers, aircraft assembly plant, Ft. Crook, Nebraska, $2887.
Champion Blower & Forge Co., Lancaster, Pa., riveter and Smith's forges, $2079.54.
Chicago Pneumatic Tool Co., Los Angeles, rotary air screw drivers, riveters, aircraft assembly plant, Ft. Worth, Tex., $7525.
Chicago, Rock Island & Pacific Railway Co., Chicago, wheel borers, lathes and planers, $4942.
Cleveland Pneumatic Tool Co., Cleveland, air drills, aircraft assembly plant, Ft. Worth, Tex., $4500.
Crane Co., Chicago, valves and fittings, $3666.04.
Electric Wheel Co., Quincy, Ill., spare parts for two-wheel trailers, $4407.57.
Flotation Systems Inc., Los Angeles, air corps gasoline fueling system and oil storage at basic flying school, Enid, Okla., $130,313.
Four Wheel Drive Auto Co., Clintonville, Wis., boring machine with spare parts, $31,023.38.
Fuchs Machinery & Supply Co., Omaha, Nebr., steel machine benches, vacuum cleaners, aircraft assembly plant, Ft. Crook, Nebraska, $9004.
General Electric Supply Corp., Washington, electric lighting equipment, $71,-827.04.
Hubbard & Floyd Inc., New York, centrifugal pumps, aircraft assembly plant, Ft. Worth, Tex., $6450.
Industrial Equipment Co., Kansas City, Mo., casters, aircraft assembly plant, Kansas City, Kans., $3765.
Interstate Machinery & Supply Co., Omaha, Nebr., oil extractor, centrifugal, aircraft assembly plant, Ft. Crook, Nebraska, $2887.50.
Joliet Wrought Washer Co., Joliet, Ill., wrought iron washers, $2067.10.
Joyce-Cridland Co., Dayton, O., jacks, $3863.36.
Leschen, A., & Sons Rope Co., St. Louis, wire rope and wire rope clips, $2709.50.
Machinery Sales & Supply Co., Dallas, Tex., engine lathe accessories, surface planer with equipment, aircraft assembly plant, Ft. Worth, Tex., $10,-424.88.
Magnaflux Corp., Chicago, inspection unit, aircraft assembly plant, Ft. Worth, Tex., $2490.
McKiernan-Terry Corp., New York, pile drivers, $21,694.40.
McMaster Carr Supply Co., Chicago, winch hoists, $4520.
Moore Machinery Co., Los Angeles, power hammers and accessories, aircraft assembly plant, Ft. Worth, Tex., $2400.
Moyer, C. Joseph, Ocean City, N. J., five launches at Ocean City, N. J., $102,750.
Noland Co. Inc., Washington, plumbing supplies, $3189.05.
Outboard Marine & Mfg. Co., Johnson Motors Division, Waukegan, Ill., spare parts for outboard motors, $2913.
Pressed Steel Car Co. Inc., Pittsburgh, dump cars, $43,825.
Railroad Products Co., Cincinnati, locomotive water columns, $32,789.65.
Ransome Concrete Machinery Co., Dun-

■ **Newly developed Curtiss AT-9 plane designed for training pilots for fast twin-engined fighters and bombers of the Army air service. The ship is an all-metal, low-winged monoplane equipped with retractable landing gear, is powered with two 280-horsepower radial air-cooled engines. It will be manufactured in quantity at the new Curtiss-Wright plant at Lambert Field, St. Louis. NEA photo**

nellen, N. J., mixers, $3343.10.
Russell & Stoll Co., New York, portable gang receptacle boxes, high frequency plugs, aircraft assembly plant, Ft. Crook, Nebraska, $17,212.
Sidney Machine Tool Co., Sidney, O., lathes, $26,599.
Sullivan Machinery Co., New York, core drills, $10,414.98.
U. S. Steel Export Co., Washington, rails, splice bars, and ties, $45,391.30.
Union Twist Drill Co., Athol, Mass., drills, $3348.40.
Universal Unit Power Shovel Corp., Milwaukee, cranes and attachments, $46,-161.
Wheeling Steel Corp., Wheeling, W. Va., steel pipes, $13,819.35.
Watson-Stillman Co., Roselle, N. J., presses, $5500.
White, David, Co. Inc., Milwaukee, transits, levels, Georgia air depot, Macon, Ga., $7465.
White, Robert P., Athens, Ga., automatic stokers, Georgia air depot, Macon, Ga., $13,670.70.

Chemical Warfare Service Awards

Continental Can Co. Inc., New York, gas mask components, $16,728.
Fyr-Fyter Co., Dayton, O., decontaminating apparatus, $399,019.
Stevens Metal Products Co., Niles, O., steel drums, $16,640.
Willson Products Inc., Reading, Pa., dust respirators, $48,831.

Quartermaster Corps Awards

Chicago Pump Co., Chicago, vacuum pump for boiler room, Kansas City Quartermaster depot, Missouri, $1544.
Collins Electrical Co., Stockton, Calif., overhead electrical lighting and power system, 4th Echelon base motor repair shop, Stockton, Calif., $12,883.
Corbitt Co., Henderson, N. C., 6-ton trucks, $787,500.
General Construction Co., Seattle, pier "B," Seattle Port of Embarkation, Washington, $1,944,000.
General Motors Corp., Chevrolet Division, Flint, Mich., 1½ ton cargo and dump trucks, $4,570,501.
Pittsburgh Des Moines Steel Co., Pittsburgh, elevated water tank, Columbus general depot, Ohio, $27,236.
Poe Piping & Heating Co., Greenville, S. C., heating utility steam systems, steam distribution systems and installation of boilers and controls, Camp Gordon, Georgia, $285,829.
Ramey Bros. Inc., Amarillo, Tex., facilities for the 156th station hospital, Camp Wolters, Texas, $37,639.
Schultz Trailers Inc., Elkhart, Ind., trailers, $6036.
Thompson, F. N., Raleigh, N. C., greasing and inspection racks and steel incinerator superstructure, Camp Davis, North Carolina, $86,400.
Watson, M. W., Construction Co., Topeka, Kans., installation of utilities in existing buildings, Ft. Riley, Kansas, $59,649.

Air Corps Awards

American Chain & Cable Co. Inc., American Cable Division, Wilkes-Barre, Pa., target parts, $119,650.50.
B. G. Corp., New York, spark and mica plugs, $258,073.
Bell Aircraft Corp., Buffalo, N. Y., assemblies, $87,912.
Bell & Howell Co., Chicago, cameras, $204,227.73.
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., target parts, $51,324; Pioneer Instrument Division, Bendix, N. J., airspeed indicators, $1,-210,320.
Bradford Machine Tool Co., Cincinnati, precision lathes, $226,500.
Candler-Hill Corp., Detroit, parts for maintaining and repairing fuel pumps, $51,129.75.
Continental Motors Corp., Muskegon, Mich., maintenance parts for engines, $277,120.30.
Curtiss-Wright Corp., Airplane Division, Buffalo, cabin, windshield and panel assemblies, $147,087.75.
Douglas Aircraft Co. Inc., Santa Monica, Calif., airplane equipment, $91,356.48.
Duro Co., Dayton, O., assemblies, $94,800.
General Motors Corp., New York, hardware, $803,205.17.
Gosinger, C. H., Machinery Co., Dayton, O., precision lathes, $300,566.70.
Herzog Iron Works Inc., St. Paul, assemblies, $11,552.94.
Iron Fireman Mfg. Co., Portland, Oreg., mount assemblies, $553,796.37.
Kidde, Walter, & Co. Inc., New York, fire extinguishers, $2,805,966.80.
Kinsey, E. A., Co., Cincinnati, precision lathes, $198,960.
Klauer Mfg. Co., Dubuque, Iowa, snow remover trucks, $6964.
Kline Mfg. Co., Columbus, O., target parts, $53,610.
Leece-Neville Co., Cleveland, assemblies, $240,625.
Linde Air Products Co., New York, acetylene cylinders, $61,000.
Line Material Co. of Pennsylvania, East Straudsburg, Pa., lamp assemblies, $134,478.11.
Lockheed Aircraft Corp., Burbank, Calif., maintenance parts, $64,171.20.
Magnavox Co. Inc., Ft. Wayne, Ind., assemblies, $44,200.
Manning, Maxwell & Moore Inc., Bridgeport, Conn., gage units, $372,614.90.
Moore Eastwood & Co., Dayton, O., assemblies, $99,975.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., precision lathes, $214,800.
Parker Appliance Co., Cleveland, aircraft fittings, $240,210.90.
Republic Aviation Corp., Farmingdale, L. I., maintenance parts, $3,130,349.91.
Robinson, C. S., Ithaca, N. Y., camera mounts, $167,028.
Service Tool & Engineering Co., Dayton, O., assemblies, $187,884.85.
Smith, Charles E., & Sons Co., Cincinnati, assemblies, $328,080.
Sparks-Withington Co., Jackson, Mich., bomb hoist assemblies, $633,148.60.
Spriesch Tool & Mfg. Co. Inc., Buffalo, assemblies, $367,400.
Square D Co., Kollsman Instrument Division, Elmhurst, N. Y., pilot tubes, $4,689,233.
Warner Industries Inc., Cincinnati, tow target assemblies, $518,400.
Webster Electric Co., Racine, Wis., assemblies, $98,890.60.
Westinghouse Electric & Mfg. Co., Dayton, O., assemblies, $56,438.
Wright Aeronautical Corp., Paterson, N. J., propeller and hub assemblies, test cowlings and rocker box covers, $73,-961.76.
Yale & Towne Mfg. Co., Stamford, Conn., pump assemblies, $505,000.

Defense Corp. Finances More Plant Expansions

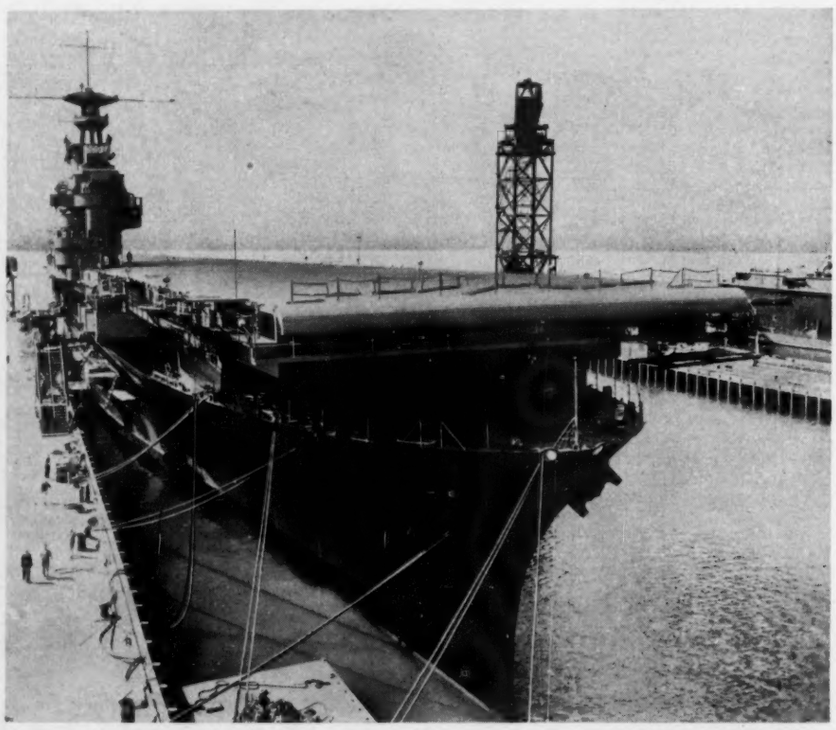
■ War Department last week reported more lease agreements have been completed between the Defense Plant Corp. and manufacturers for the establishment of new facilities for production of equipment essential to the army. Title to facilities purchased and installed under the agreements will be retained by the Defense Corp. Approved by the Office of Production Management, the agreements included:

Woodworth, N. A., Co., Ferndale, Mich., $592,045 increase for acquisition of additional facilities at its existing plant at Ferndale, for manufacture of aircraft engine parts. Company's total authorization is now $1,568,389.

Bridgeport Brass Co., Bridgeport, Conn., $820,000 increase for expansion of facilities at the existing plant in Indianapolis, for cartridge case manufacture. This increases total lease agreement to $12,320,000.

Allis-Chalmers Mfg. Co., Milwaukee, $9,-066,964 for acquiring and establishing an additional plant at or near West Allis, Wis., together with machinery and equipment to be used therein for manufacture of aircraft engine superchargers.

American Welding & Mfg. Co., Warren,



■ **United States Navy's newest aircraft carrier, the U. S. S. HORNET, was commissioned last week at Norfolk, Va. The 760-foot, 20,000-ton vessel will have a speed of more than 30 knots. NEA photo**

O., $484,000 for establishment of an additional plant at Warren, together with acquisition of additional machinery and equipment, for manufacture of tank parts.

American Propeller Corp., Toledo, O., $3,632,308 increase for acquisition of additional machinery and equipment for use in the existing plant at Toledo in manufacture of steel propeller blades. This increases the company's lease agreement to $10,858,350.

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Jesse Jones, federal loan administrator, reported last week the following lease agreements were executed between Defense Plant Corp., subsidiary of the Reconstruction Finance Corp., and companies whose facilities are considered insufficient. Title will remain with the Defense Corp. The agreements:

Niles-Bement-Pond Co., West Hartford, Conn., $405,000 for purchase of equipment to be used in plant at West Hartford for manufacture of machine tools.

Tinco Forging Die & Tool Co., Chicago, $32,430 for purchase of equipment to be used in the plant at Chicago for manufacture of aircraft equipment.

Clark Aero-Hydraulics Inc., Pasadena, Calif., $87,535 for purchase of equipment for plant at Pasadena, to be used in manufacture of aircraft equipment.

Continental Motors Corp., Detroit, increase in lease agreement from $9,500,000 to $12,580,000 for additional machinery and equipment for the Detroit plant. Facilities to be used in manufacturing engines for military tanks.

Extruded Metals Defense Corp., Grand Rapids, Mich., commitment increased from $6,266,000 to $6,615,761, for additional facilities for plant at Belding, Mich. Equipment to be used in making extruded aluminum alloys.

Scintilla Magneto Division of Bendix Aviation Corp., South Bend, Ind., increase from $2,550,000 to $3,195,308 for additional facilities at plant in Sidney, N. Y., to be used in production of aircraft equipment.

Washer Industry Gets $12,000,000 Defense Order

■ Three companies in the household washer and ironer industry have been awarded a $12,000,000 contract for .50-calibre antiaircraft gun mounts, and will share the work with other members of the industry through subcontracts, it was reported last week by the army's Contract Distribution Division.

Prime contracts were placed with Nineteen Hundred Corp., St. Joseph, Mich.; Apex Electrical Mfg. Co., Cleveland; and Easy Washing Machine Corp., Syracuse, N. Y. Subcontracts will be placed with other certified companies in accordance with recommendations made by a committee representing the industry.

Negotiations resulting in the award followed shortly certification by OPM that 34 companies in the industry faced severe unemployment due to curtailment of nondefense production and that they should be given special consideration in placing of defense work.

This is reported the first industry-wide certification under procurement policies recently worked out by OPM and the armed services to increase defense production and prevent dislocations wherever practicable by spreading armament orders into plants whose nondefense production must be curtailed.

Contract for 1200 Light Tanks Awarded A. C. F.

■ American Car & Foundry Co., New York, has been awarded an order for 1200 additional 12½-ton light combat tanks, it was reported last week by Charles J. Hardy, president. Totaling approximately $31,000,000, the order was for complete tanks, spare parts and replacement parts.

Three-fourths of the tanks to be delivered under this contract will be powered with gasoline engines. The remainder will be diesel equipped.

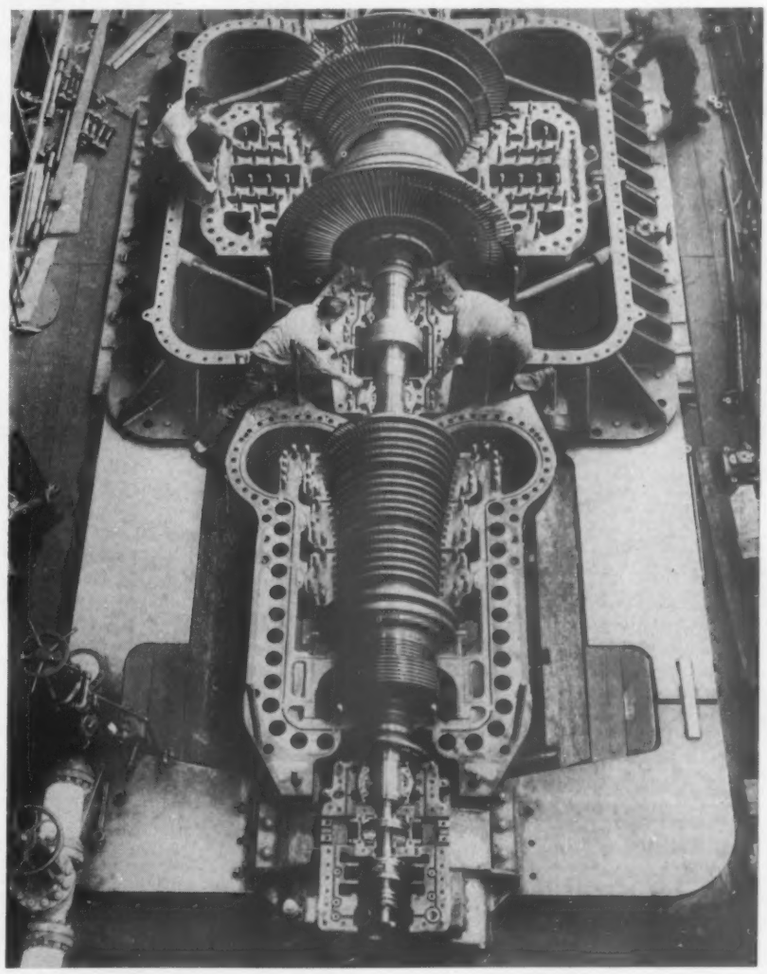
The company's combined orders for these light combat tanks, according to Mr. Hardy, now total 5885.

Estimated Defense Cost $37 a Month, Per Family

■ Cost of the national defense program, as now planned, will be more than $77,000,000,000 over the next five years, according to the National Economy League, Washington. This is equal to $2225 or $37 per month over that period for each American family.

The total includes the pending supplemental $6,000,000,000 lease-lend appropriation. Present authorizations, the league reported, make no provision for regular operating and maintenance expenses of the armed forces after June 30, 1942. Latter were tentatively estimated at $5,000,000,000 annually for the period 1942-45.

Cash payments for the defense program from July 1, 1940 to Oct. 15, 1941, according to the United States Treasury Department, totaled $10,185,487,712. Appropriations, contract authorizations and other commitments aggregated about $58,000,000,000 in the period.



■ These thousands of precision-finished stainless steel blades for a new 50,000-kilowatt turbine to be installed in the Toledo Edison Co.'s Acme generating station, Toledo, O., are shown here receiving a final check before shipment from Westinghouse Electric & Mfg. Co.'s South Philadelphia works. Blades will attain tip speeds as high as 850 miles per hour, the company reports

American Tool Engineers Impressed By Canadian Armament Factories

TORONTO, ONT.

■ AS GUESTS of the Toronto and Hamilton, Ont., chapters, more than 600 members of the American Society of Tool Engineers convened at Royal York Hotel Oct. 16-18 for the society's semiannual meeting. Keynote of the convention was "The Tool Engineer Turns to War Production."

Extent of Canada's war production effort—which incidentally is closely keyed in with that of the United States in many respects, and which to a large extent is being carried out with the help of the latest model American machine tools—was described by C. D. Howe, minister of munitions and supply of the Canadian government.

Mr. Howe pictured Canada as a rapidly rising industrial nation, one already close to self-sufficiency in defense production, and above all one determined to win the war by hard work backed up by liberal expenditures.

"Canada's whole economy," he said, "has been converted to the prosecution of this war, and more than 50 per cent of the national income now is being used directly for war purposes. Since the outbreak of the war, Canada has shipped military vehicles to every theater of the war—already having produced upward of 200,000.

"Shell production has exceeded 7,000,000 units since the war began, and production rapidly is increasing. Canada's output of explosives not only is sufficient to fill all shell and bombs produced in Canada but also provides substantial exports to Britain.

40 Planes Per Week

"Canada now has an output of 40 planes per week—half of them trainers, the other half bombers. We in Canada have tightened our belts and are ready for what the future may bring. We are confident of the power of a free people to triumph over the forces of destruction."

In a similar vein Thomas Arnold, machine tool controller of the Canadian government, said, "Even if we could not get another tool in Canada, we are set now so that by switching our tools around we can fill any order Britain may give us. We literally have spent millions to that end since last summer."

An interesting feature of the meeting and one which Americans might well study in connection with their own defense program was the friendly debate between Arnold Thompson, noted Canadian tooling expert, and Fred Dull, vice president, Monarch Machine Tool Co., Sidney, O., on the relative merits of used machine tools and new machine tools in the meeting of the defense production emergency.

Mr. Thompson gave examples from his own wide experience of ingenious examples of gun lathes made from turret lathes, broaching machines made from draw benches and similar improvisations. Mr. Dull told what modern machines would do as compared to those of the first World war—gains of ten times in production efficiency being common.

In conclusion, Mr. Thompson said, "This war will not wait for us to attain perfection. In many cases we must use what we can get, not what we would prefer."

Must Use All Machines

"This," agreed Mr. Dull, "is not the time to argue the question of new machines versus old machines. We can do that when the war is over. Just now we face a crisis involving the freedom of the world. It is vital that we use every machine—old and new."

Other speakers at the technical sessions were Roy T. Wise, deputy machine tool controller of Canada, on cutter conservation; Philip M. McKenna, president, McKenna Metals Co., Latrobe, Pa., on the effective wartime use of carbide tools; Walter Esau, E. F. Houghton Co., Philadelphia, on cutting oils and how to apply them most effectively; Roy M. Sherk, director of war emergency classes, Western Technical-Commercial High School, Toronto, on the task of schools in training for war production activities; and Edward Kennard, plant manager, St. Catherines Steel Products, St. Catherines, Ont., on industry's responsibility in the same direction.

Commander Edmund W. Strother, United States naval attache at Ottawa, attended the convention as personal representative of Secretary of the Navy Frank Knox, and greetings from the United States War Department came in the form of a personal letter from Secretary of War Henry L. Stimson.

Wartime restrictions prevent detailed reporting here of the tremendously impressive plant inspection trips in Toronto and neighboring cities which those attending the convention were privileged to make during two of the three days. Suffice it to say that small arms—including light and heavy machine guns; antiaircraft guns; shell and cartridge cases; power plants for ships; and many other vital items are being turned out by methods and at rates of which the average American south of the border has little or no conception.

Several hundred tool engineers returned from Canada after the convention inspired and encouraged by what they had seen. It was both an inspiration and a challenge to greater efforts in the States.

Dominion's War Orders Total $2,578,186,766

TORONTO, ONT.

■ War contracts placed and commitments entered into by Canada's Department of Munitions and Supply and its predecessor bodies on behalf of the Dominion, the United Kingdom and other countries from July 14, 1939, to Sept. 30, 1941, totaled $2,578,186,766, it was reported last week by C. D. Howe, minister of munitions and supply. More than 180,000 contracts have been placed on Canadian account, with average value $8300.

Aggregate orders for stores placed on United Kingdom account in the period was $751,872,000. Canada's total was $1,530,290,087.

Awards placed in the two weeks ended Oct. 14 numbered 7367, with combined value $16,272,275. United States companies received orders totaling $2,580,145. Contracts included:

Shipbuilding: Hughes-Owens Co. Ltd., Ottawa, Ont., $28,035; McCall & Co. Ltd., St. Williams, $6250.

Land transport: International Harvester Co. of Canada Ltd., Ottawa, Ont., $10,945; W. D. Beath Ltd., Toronto, $220,831; Ross Cycle & Sports Ltd., Toronto, $5624; General Motors of Canada Ltd., Oshawa, $17,360; Brantford Coach & Body Ltd., Brantford, $11,491; Chrysler Corp. of Canada Ltd., Windsor, $215,611; Ford Motor Co. of Canada Ltd., Windsor, $22,767.

Dockyard supplies: General Steel Wares Ltd., Montreal, Que., $13,920; Gunite Waterproofing Ltd., Montreal, $102,640; Asphalt Products Ltd., Calgary, Alta., $10,269.

Aircraft: Canadian Pratt & Whitney Aircraft Co. Ltd., Longueuil, Que., $31,761; Canadian Vickers Ltd., Montreal, $454,820; Noorduyn Aviation Ltd., Montreal, $12,474; British Aeroplane Engines Ltd., Montreal, $88,290; Link Mfg. Co. Ltd., Gananoque, Ont., $5670; De Havilland Aircraft of Canada Ltd., Toronto, $24,236; Dunlop Tire & Rubber Co. Ltd., Toronto, $20,339; Fleet Aircraft Ltd., Fort Erie, $6128; National Steel Car Corp. Ltd., Malton, $40,395; MacDonald Bros. Aircraft Ltd., St. James, Man., $14,899.

Instruments: Hughes-Owens Co. Ltd., Ottawa, Ont., $113,827; Department of Transport, Ottawa, $13,034; Canadian Aircraft Ltd., Leaside (Toronto), $652,499; Research Enterprises Ltd., Leaside, $429,337; Canadian Dental Trade Association, Toronto, $5400; Fisher & Burpe Ltd., Winnipeg, Man., $7546.

Electrical equipment: Electric Tamper & Equipment Ltd., Montreal, Que., $24,000; Peacock Bros Ltd., Montreal, $32,500; Canadian General Electric Co. Ltd.,

(*Please turn to Page* 109)

Canada Extends Wage, Price Control Over All Industries, Commodities

TORONTO, ONT.

■ CANADA'S Order-in-Council P. C. 7440, issued in June and originally applying only to wages in plants engaged in war manufacture, has been extended to include a ceiling on wages in virtually all industry as well as on prices of all goods and services sold in the Dominion. Operation of the original order and its effect on industry, labor and prices was described in detail in STEEL, Oct. 20, p. 47.

Formerly P.C. 7440 could be enforced only through Boards of Conciliation appointed under the Industrial Disputes Investigation Act, for whose guidance it was formulated, and prescribed only for industries within control of the Dominion and not those within authority of the provinces. Now P.C. 7440 provides a compulsory wage policy for all industry in Canada and is enforced by provinces also.

Its purpose is to keep workers' income and essential outlays in line and thus avoid inflation as far as possible. Order-in-Council P.C. 7440, as it now stands, is planned also to curb labor disputes by setting maximum and minimum wages. However, Canada's labor troubles today are largely confined to disputes relating to union recognition and bargaining rights.

Prime Minister Mackenzie King, in a radio address Oct. 18, announced the government's program for curbing inflation, and made special reference to P.C. 7440 as a means of correcting various labor situations.

"The policy of limiting the rise of wages is a vital part of the policy of safeguarding wage-earners as consumers from the evil effects of a rising cost of living . . . A beginning was made in working out a wage policy when Order-in-Council P.C. 7440 was enacted. While this experiment has been widely accepted by employers and employes in war industry, certain defects in the procedure must now be remedied.

Broadened Policy Essential

"Industries not engaged in war production have not been subject to this control. Wage rates of many of these industries have continued to rise. In others there has been no rise to offset the increased cost of living. Even in the war industries, because of the increasing scarcity of labor and the absence of penalties for violation, the policy was not completely successful.

"After consultation with representatives of the provinces, of employers and employes, the government has found general agreement with its view that its wartime wage policy could succeed only if it were broadened and strengthened and machinery were established for its enforcement.

"The government has therefore decided to extend its wartime wage policy to cover all industry. Henceforth no employer in Canadian industry or commerce may, without permission, increase his present basic wage rates. After Nov. 15 every employer will be obliged to pay a bonus in accordance with the terms specified by the government order, and to adjust the bonus regularly every three months in accordance with a definite formula.

"In future all employers will pay a bonus on the same basis. Penalties will be imposed for failure to comply with the order. The administrative machinery will consist of a National War Labor Board and several regional boards. Each will be equally representative of employers and employes."

In addition to establishing maximum and minimum wages and making payment of cost-of-living bonuses compulsory, it also has been decided to halt rise in prices of all goods or services sold in Canada by imposing a general ceiling on prices. This is in keeping with the desire to stop inflation.

"On and after Nov. 17, 1941," declared Mr. King, "no person may sell any goods or supply any services at a price or rate higher than the maximum price or rate charged by him for such goods or services during the four weeks from Sept. 15 to October 11 of the present year . . . Except in cases where minimum prices are fixed, prices will be free to fall below the ceiling. This order also applies to rentals, electricity, gas, steam heat, water, telegraph, wireless and telephone services, the transportation of goods . . ."

It is estimated about 5000 will be needed to administer the program.

■ **Value of skill and technique gained through age and experience has been repeatedly demonstrated in prosecution of the war effort in Canada, and applies especially to aircraft manufacturers. Here an employe is shown working on the cowling of a Harvard trainer plane in a Canadian plant. Warning in the background refers to the layer of pure aluminum which covers and protects from corrosion the metal-alloy underneath. NEA photo**

Canadian Foreign Trade

■ Canadian steel and iron imports in August totaled $36 671,000, compared with $30,786,000 in August, 1940. Machinery imports, except agricultural, were largest, valued at $11,395,000; vehicles, $6,002,000; rolling mill products, $4,983,000; farm implements, $3,025 000; engines and boilers, $2,456,000.

August exports totaled $22,759,000, almost double $11,659,000 exports in August, 1940. Automobiles and parts, valued at $15,119,000, made the largest item. Pig iron and steel exports totaled $1,904,000, machinery, other than agricultural, $1,481,000 and farm implements $1,000,000.

Association Reports Industrial Gas Supplies Ample for Defense Needs

■ FEW bottlenecks are apparent in the supply of industrial gas for the defense program although the heavier load required, notably for the metalworking industry, involves more extensive use of gas as fuel in heat treating with rigid temperature control, was the consensus reached last week by the American Gas Association.

Twenty-third annual meeting of the association, held at Atlantic City, N. J., Oct. 20-23, was concerned primarily with the defense program, its influence on the gas industry, and the aftermath, for which a new economy was freely predicted.

George A. Hawley, president, Bridgeport Gas Light Co., Bridgeport, Conn., was elected president of the association; George F. B. Owens, Brooklyn Union Gas Co., Brooklyn, N. Y., chairman, Industrial and Commercial Gas Section; John A. Robertshaw, Robertshaw Thermostat Co., Youngwood, Pa., chairman, Manufacturers' Section; and Harold L. Gaidry, New Orleans Public Service Inc., New Orleans, chairman, Technical Section.

Sales Volume Increasing

Sales of industrial gas are reported increasing, with all sections of the country sharing in the rise. For instance, in New England, 1940 sales were 10 per cent larger than the previous year and 18 per cent higher the first six months of 1941 than in the like period of 1940. The uptrend continues.

Industrial gas has been conducting a carefully planned and executed program of research, development and national advertising. Manufacturers of industrial gas equipment have been continually striving, with the aid and advice of industrial gas utility men, to devise better means of applying heat to the problems of modern industry. Consequently industrial gas departments, in general carefully selected, trained and staffed, were ready to give advice on problems encountered in the rush for production.

"Industrial business has flowed to our lines," said H. Carl Wolf, president, Atlanta Gas Light Co., Atlanta, Ga., "and the benefits of our preparation have flowed out to industry. Industrial gas has taken its proper place in the vanguard of the march for national defense.

"While lolling in the luxurious comfort of self-satisfaction over a job well done, let us turn for a moment to some of the shoals ahead. Our competitors have not been idle nor will they be. Many an industrial job being done today with competitive fuel can be attributed to a lack of foresight or salesmanship on our part years ago. While we are in this seller's market, it will be very easy for us to make the same mistake and our industry will pay for it for years to come . . . "

Increase in consumption by existing customers of industrial gas is notable, especially in the metalworking field. Much increased business is planned without concern as to available fuel. It could almost be said availability and dependability of gas is taken as a matter of course. Recognition of its worth, however, is demonstrated by a recent instance when a new steel mill was willing to contract for five years for gas immediatelv available rather than get a lower price for gas promised to be available when the plant was completed.

George A. Hawley
Elected president, American Gas Association

Manner in which some defense business is going to present customers is illustrated by a new shipyard in the South that was to build destroyers. First estimates indicated a large gas consumption for a wide variety of furnaces, and service facilities were provided accordingly.

As orders for facilities began to be placed and difficulties with deliveries were realized, surveys were made of existing equipment already installed in other shops in the territory. Result was that many types of heat treating and other operations requiring fuel have been subcontracted. This increases gas requirements of the subcontracting firms and today it appears actual deliveries to the shipyard will never be as high as anticipated when the pipe line and meter station were installed.

"Without minimizing in the least the part gas has played in the emergency, I am convinced that its importance has depended upon gas reserves, facilities and man-power which already existed before the emergency and were ready to do whatever might be required of it," said J. V. Strange, vice president, United Gas Corp., Houston, Tex.

"Since this is true, it seems that it must logically follow that the gas industry can best continue to contribute its part in the present emergency and to what may come after, by maintaining a sound economic position that will enable it to continue to have adequate reserves, ability to supply adequate facilities and to continue to furnish competent manpower in any of its various operations."

Summarizing effect of air raids on London and other English cities, Davis M. DeBoard, vice president, Stone & Webster Service Corp., New York, indicated that although bombs have pierced many holders, causing loss of gas, this does not cause fires. Holders can be quickly repaired and put in operation again.

From all accounts, very few gas plants have been put out of commission and the damage done by bombs has been quickly repaired.

1940 Coke By-Products Output $160,000,000

■ By-products produced in the manufacture of coke by the steel industry in 1940 totaled approximately $160,000,000, according to the American Iron and Steel Institute. The coke was used principally as fuel in blast furnaces producing pig iron.

Produced from each ton of coal through the coking process were about seven-tenths of a ton of coke, large quantities of gas, tar, crude light oil, and many chemicals. Most important by-product last year was the gas, aggregating 638,000,000,000 cubic feet and valued at nearly $98,900,000. Part of the gas was used to heat coke ovens, some as fuel elsewhere in the mills, and the remainder sold.

Tar recovery totaled more than 515,000 000 gallons, worth nearly $23,700,000. Output of light crude oil, 165,000,000 gallons, was distributed into many channels. Nearly 8,000,000 gallons were sold, totaling more than $600,000. The rest was further refined into benzol, toluol, naphtha, and the many chemical derivatives of coal. These were given a total value of $16,500,000. Ammonium sulphate and ammonia liquor recovered had a combined value of $14 500,000. Coke screenings produced totaled $6,500,000.

Gear Manufacturers Point to Need for Blanket Priority

CHICAGO

■ ONE HUNDRED FIFTY members of American Gear Manufacturers Association considered economic and technical problems facing their industry as a result of the defense program, at the association's twenty-first annual convention here Oct. 20-22. Although of tremendous importance, the industry does not yet have the advantage of a blanket priority.

Speakers, including W. P. Schmitter, president; J. H. Flagg, vice president; and J. C. McQuiston, secretary of the association, bore down heavily on increasing pressure put on the industry. They drew a vivid picture of the difficulty being experienced by many members of the industry in obtaining hobs, cutters and other tools, and the imminent possibility that the industry soon will experience a crisis in raw materials, the bronzes in particular.

While the hoped-for blanket priority still remains only a possibility as far as Washington is concerned, a number of helpful expedients were suggested by Edmund H. Eidel of OPM's Chicago regional office. He pointed out that hoarding is being discouraged and that reviews of various programs such as that for tanks is leading to reallocation of machines, tools and materials which are not needed immediately. In other words, OPM is taking steps to see that critical machines, tools and materials do not lie around idle in one place awaiting completion of other parts of one program, when they can be put to work at once on some other program. He indicated that there will be rather sweeping changes as a result of such surveys.

Mr. Eidel also called attention to the OPM provisions for expediting "emergency repair orders" in the case of such industries as that of gear manufacture. In a breakdown of vital production equipment, say a gear cutting machine, no application to Washington is necessary to get quick action on parts for repairs. Industry has been placed on the "honor system," and a company's own word as to the seriousness of the case is all that is necessary to get parts in a hurry. "This is a privilege which industry should guard carefully," he said.

Proof that the industry has developed technically to an amazing degree since the organization of the association in 1917 was given by a number of papers presented at the meeting, which were based upon real engineering research. It is indeed a far cry from the empiricism and rule-of-thumb methods of other days to the projects now being carried out in behalf of the industry in the engineering laboratories at University of Illinois, University of Michigan, Massachusetts Institute of Technology, and others.

Had such programs not been inspired by the association it is safe to say many vital phases of national defense would be far behind what they are today, both in quantity and quality of output. Mechanized warfare demands more and better gears. Had research not already been carried out, this unquestionably would have constituted a major "bottleneck." As things stand, however, the gear industry is in a position to say "Give us the tools and materials, and we will give you the gears." If the industry were as confident of its ability to "get" as it is of its ability to "give," it would have no misgivings as to its continued successful role in the defense program.

Among the technical speakers were: J. O. Almen of General Motors Corp., on "Facts and Fallacies of Stress Determination"; Allen H. Candee of Gleason Works, on "Geometrical Determination of Tooth Form Factor," and also on "Calculated Bending Stress in Spur Gear Teeth"; and T. J. Dolan and E. L. Broghamer of University of Illinois on "Photoelastic Study of Stresses in Gear Tooth Fillets."

Important research progress reports included one by L. D. Martin on the technique of generating fine pitch gears; one by H. A. McConville on extreme pressure lubricants; one on sound testing and one on gear steels. Dr. Stewart Way told of his studies of gear tooth pitting through use of rolling cylinders.

Budd Completes Millionth Aerial Bomb

■ **Employes of Edward G. Budd Mfg. Co., Philadelphia, rallied recently to witness presentation of the millionth aerial fragmentation bomb produced at the plant to Col. D. N. Hauseman, chief, Philadelphia Ordnance District. Ceremonies were held outside the company's bomb shop. Colonel Hauseman is shown holding the bomb, reported one of the deadliest missiles of its type. NEA photo**

Foundries Making Substitutions That "Would Not Be Tried in Normal Times"

■ HOW the foundry industry is adjusting itself to the growing shortage of certain raw materials was the subject for a large part of the discussion at the Joint Regional Foundry Conference held at West Lafayette, Ind., Oct. 17-18. The meeting was sponsored by various district chapters of the American Foundrymen's Association as well as by the parent body and Purdue University. Attendance at the sessions totaled about 200.

Current practice at most foundries today in regard to substitutions in raw materials was typified by the statement made by M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., that "sometimes in case of emergency we do things we would never attempt in normal times."

As an illustration he mentioned the use of badly oxidized carbon steel carburizing boxes in place of good steel scrap. The company found that when these boxes were mixed with other steel scrap, no bad effects were noted either in the melting process or afterward in the castings.

Iron Briquettes Used

Another substitution practiced by the Caterpillar foundry is increased use of iron briquettes in place of motor block scrap. The amount used varies with the supply, averaging between 15 and 25 per cent of the total charge.

The Caterpillar company for the past several years has used copper as a substitute for nickel in all but a few applications. Copper is used in conjunction with one of the common carbide forming elements, such as molybdenum or chromium. Experience has shown that copper may be substituted for nickel in amounts up to 1 per cent with no apparent change in physical values, except possibly the impact values, according to Mr. Gregory. Applications of copper in iron include cylinder heads, axle housings and final drive housings.

Cylinder liners use chromium and nickel, but the nickel is obtained in the form of scrap turnings from the plant's machine shop. These turnings are segregated, baled and delivered to the foundry.

Other substitutions reported by Mr. Gregory include used fire brick in place of new brick and a replacement material for plumbago used in mold wash on skin dried molds. One plumbago substitute said to show considerable promise consists of a base of American or Mexican plumbago mixed with a large amount of silica flour, plus suitable binder.

Steel and malleable scrap charged by the average malleable iron foundry has changed in recent months, it was pointed out by P. A. Paulson, Gunite Foundries Corp., Rockford, Ill. Instead of the steel rails and railroad malleable scrap formerly obtained, the malleable scrap now delivered is a mixture of agricultural and automobile material. Although brake drums and differential assemblies can be removed, much steel remains.

Non-recoverable material, such as dirt and rust, is greater for a given weight of miscellaneous malleable scrap than for railroad material. Based on information obtained from the Malleable Founders Society, Mr. Paulson stated the loss was more than double that for railroad castings.

Scarcity of steel rails has necessitated substitution of other low carbon scrap, particularly bundled material. While previous use of this scrap had been unsatisfactory, it has recently been used in considerable amounts in the cupolas and the air furnaces with good results, the speaker said. The practice of burying it in the charge has helped greatly. One advantage of bundled scrap is that the phosphorus content of the melt may be reduced several points more than in the use of steel rails which often show that they have been made of bessemer steel.

A warning to foundrymen not to consider as permanent the business which has accrued to them through scarcity of certain metals was voiced by Carl F. Joseph, chief metallurgist, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich. He pointed out that graphitic steel offers the best replacement for aluminum in the manufacture of automobile pistons but added:

"The gage of any return to such parts as aluminum alloy pistons will be its engineering performance versus graphitic steel, availability of the metal and its ultimate cost. The current enormous expansion of the aluminum industry suggests that before long there will be so much aluminum available that it may go begging and at a price per unit of volume that will give present replacements some close competition. This means that it will be necessary for you foundrymen to be just one jump ahead of your competitor and continue to produce a superior product which will keep you in the lead at all times."

Mr. Joseph described numerous instances in which ArmaSteel, a graphitic steel made from white cast iron by the Saginaw company, has been substituted for nonferrous and forged steel parts. These include a number of machine gun parts in which the replacement effected savings of 10 to 50 per cent in manhours of machining time compared with fabrication from bar stock or forgings. Large ArmaSteel pistons of diesel-electric locomotives have given substantially better service than aluminum or gray iron pistons, many of these engines traveling up to 200,000 miles without piston failure.

Various other papers presented at the two-day conference covered technical details of gray iron, malleable, nonferrous and steel foundry practice.

"Strikes Causing Greater Loss Than Lack of Scrap"

■ Scrap iron and steel industry has provided 18,500,000 gross tons of scrap during the first nine months of 1941, equal to the total tonnage used in 1940, according to Edwin C. Barringer, secretary, Institute of Scrap Iron and Steel Inc., Washington.

Before the end of this year dealers will have supplied 25,000,000 tons, Mr. Barringer continued. To get this tonnage all known sources of scrap are being combed. Auto wreckers are being asked to increase their output, and a program to get scrap from 6,000,000 farms has been started.

Mr. Barringer contended there is sufficient scrap for all primary and secondary defense needs. "We are trying in every way to get enough scrap for all purposes—defense and civilian—but some readjustment may be necessary without making defense suffer."

"More steel production has been lost through strikes than through a shortage of scrap," Mr. Barringer added.

Scrap Stocks Reduced 5 Per Cent in July

■ Domestic stocks of steel and iron scrap at consumers' and suppliers' plants and in transit July 31 amounted to about 6 208,000 net tons, 5 per cent less than 6,529,000 reported June 30, according to the Bureau of Mines.

Stocks held by consumers and suppliers at the close of July were equivalent to a 5-weeks' supply at the rate of consumption in that month, the same situation as at the end of June.

Although total stocks decreased 5 per cent, those on hand at consumers' plants and in transit to

them declined only 3 per cent, from 5,051,000 tons June 30 to 4,911,000 July 31. Suppliers' stocks declined from 1,478,000 tons June 30 to 1,297,000 July 31, a decrease of 12 per cent. Most of this was attributed to smaller dealer stocks, which were 14 per cent less at the end of July, with automobile wreckers', railroads' and manufacturers' stocks 3, 7 and 22 per cent less, respectively.

In western Pennsylvania, eastern Ohio and West Virginia reported stocks of purchased and home scrap were equivalent to at least four weeks' supply at the July rate of consumption. Other leading scrap-consuming areas had four to six weeks' supply. Inventories in New England and western states were equivalent to 12 and 11 weeks' supply, respectively, and in the southwestern states there was sufficient scrap for 24 weeks. Estimate of consumer stocks is based on the assumption that companies reporting their inventories held 98 per cent of total consumer stocks.

Total consumption of ferrous materials, scrap and pig iron, was 9,696,000 net tons in July, consisting of 24 per cent purchased scrap, 28 per cent home scrap and 48 per cent pig iron. During second quarter these percentages were 24, 29 and 47, respectively. Despite the increase in pig iron consumption in July as compared with second quarter, stocks of pig iron increased 7 per cent in July.

Foundry Equipment Sales Index Up in September

■ Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed for new equipment in September was 372, compared with 298.2 in August and 368.4 in July. Index for repairs was 339.2, compared with 356.9 in August and 326.9 in July. Total sales index was 363.8 in September, 312.9 in August and 358.1 in July.

Indexes are percentages of monthly averages of sales to metalworking industries, 1937-39. Practical comparisons of figures on the old base can be determined by multiplying by 1.328.

■ Acme Steel Co., Chicago, strip steel and strapping producer, was one of the winners of certificates of excellence given annually for outstanding employe publications by the National Safety Council.

$15,000,000 Mill To Be Built by Alcoa

■ Aluminum Co. of America will erect a second blooming mill at Massena, N. Y., to supply stock for the manufacture of forgings for airplane motors and fittings, and rod, bar and wire for national defense industries. OPM officials have stated the expansion was necessary to the defense program.

The blooming mill and its necessary facilities will be housed in steel and brick buildings covering an area of more than 450,000 square feet. A completely new melting department will be established to serve the blooming mill.

Largest of the buildings for the new mill will be approximately 160 x 1400 feet. The buildings will be similar in design and construction to the present blooming mill buildings; while the mill itself will be of the latest type.

It is estimated the mill will cost in excess of $15,000,000.

Celebrate Completion of Defense Building "In True Navy Style"

■ General Electric Co.'s new hydraulic control building, Schenectady, N. Y., was dedicated recently at evening ceremonies attended by Navy officials, company executives and employes. In true Navy style, the building was christened with a bottle of champagne. The ceremony reached a climax when two huge bombs exploded in the sky, releasing American flags which floated to earth under parachutes, lighted by three 60-inch searchlights. The building covers 300,000 square feet, and is operated by General Electric under lease arrangement with the Defense Plant Corp.

Turner Construction Co., New York, has been awarded a contract for a 240 x 320-foot addition to the new G-E turbine building in Schenectady. Total length of the unit will be 680 feet. Plant expansion is financed by the government.

Two additional plants for manufacturing airplane turbosuperchargers are also being constructed for the company. Combined floor space of these two additions is more than 500,000 square feet.

Hundreds of the turbosuperchargers, it is reported, are being produced each week. This rate of output will increase substantially in the near future, when the first of the two additions begins operations.

STEEL

Defense's Greatest Need

■ During the past few weeks news from Washington has indicated that government officials are becoming more definite as to the dimensions of the defense program.

By piecing together certain bits of evidence, one may conclude that the planners of the defense program believe that the war will last until 1943 and possibly until 1944 and that the percentage of our national resources devoted to armament (now estimated at 15 per cent) must be increased to 30 per cent or more by the end of 1942 and probably should exceed 50 per cent at the peak of our war activity if we are to carry out our program successfully.

This schedule calls for a sharp increase in production immediately. It means that on the average every plant should double its output for defense between now and a year from now.

Obviously the increase cannot be uniform throughout industry. Some plants already heavily engaged on war orders may not be able to increase output more than 25 or 50 per cent. However, numerous establishments which just now are swinging into defense work may be able to increase output ten fold or more. Many new plants, now under construction, should be operating at full capacity by the latter part of next year.

• • •

Viewed from any angle, the schedule constitutes the most severe test American industry has ever faced. The job will challenge the ability, resourcefulness and courage of industry's personnel to the utmost.

Nevertheless, industry can do the job and do it handily if it is given half a chance. But it cannot do the job unless the government and the public co-operate more effectively than they have in the recent past.

If industry's resources are to be devoted effectively to the new, high-pressure program, government must put aside its punitive and prejudicial attitude and adopt in its place a policy of understanding and helpfulness. Industry cannot function at the highest degree of efficiency if it must be constantly alert and prepared to defend itself against unwarranted attack from government.

• • •

Nor can industry carry out its assignment properly if the public remains apathetic to the defense program. The complacency with which the nation has viewed the recent sabotaging of defense effort by unnecessary strikes is a severe indictment against the American people. If they were sufficiently appreciative of the necessity for "all out" defense effort, they would not tolerate work stoppages arising from trivial disputes.

In short, industry's plant, equipment, personnel, etc. will not be equal to the big task ahead unless these resources are supported by a national spirit of harmony, unity and courage comparable to that which prevailed in 1918.

Today this spirit lies dormant in the hearts and minds of the people. It will remain dormant as long as the President and his administration, by their acts, continue to evidence less interest in defense than in punishment, reform, favoritism and experiment.

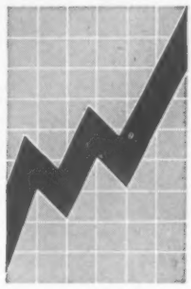
Give the people a spiritual leadership strong in integrity, sincerity and singleness of purpose and they will respond immediately with the enthusiasm that is so sorely needed at this moment.

E. L. Shaner

EDITOR-IN-CHIEF

Oct. 27, 1941

The *BUSINESS TREND*

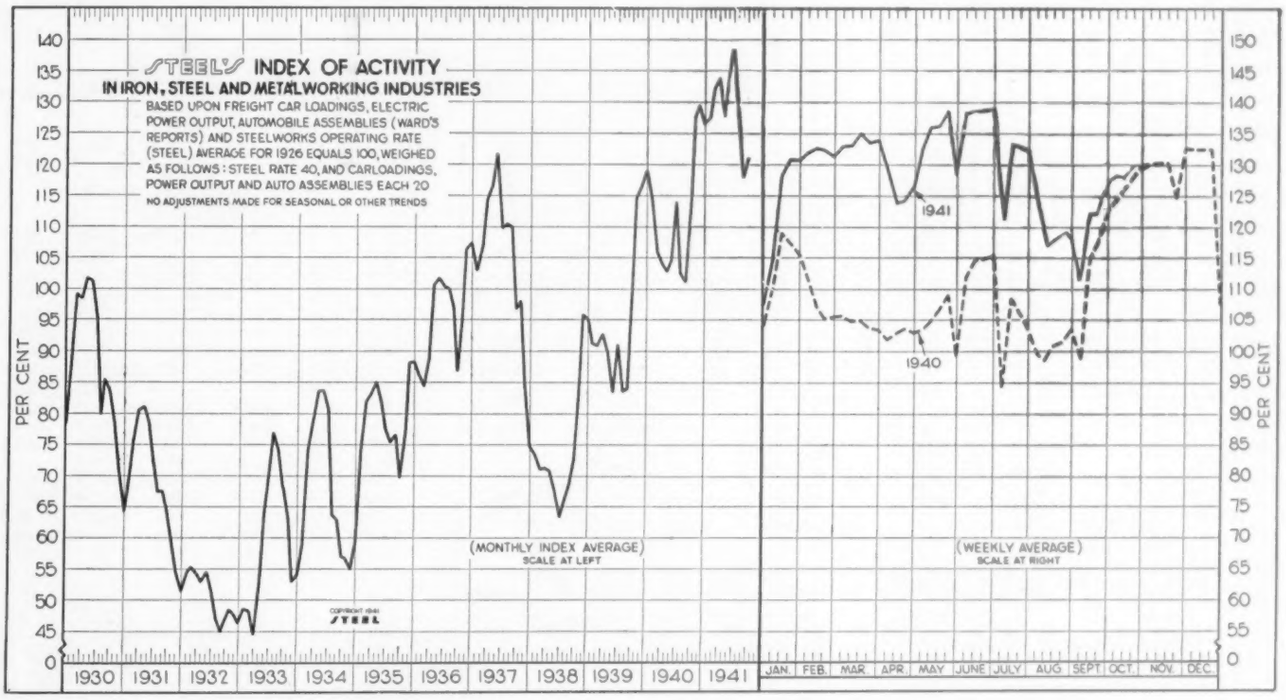


Industrial Activity Reflects Little Change

■ INDUSTRIAL output has recorded little change in recent weeks as production gains in some defense industries are largely offset by enforced curtailment in numerous civilian lines. The serious unemployment problem resulting from reduction in consumers goods output is expected to become more acute over the remainder of this year. Until new defense plant capacity is brought into operation, including increased output of strategic raw materials, Washington officials are attempting to alleviate the threatening unemployment situation by allocation of materials and are making a determined effort to remedy the unbalanced inventories said to exist in a number of instances.

STEEL's index of activity advanced 2.3 points to 130.2 during the week ended Oct. 18, reflecting the upturn in steelmaking operations, revenue freight carloadings and automobile production. A year ago the index stood at 128.3, while in 1937 and 1929 it was 101.8 and 106.1 respectively.

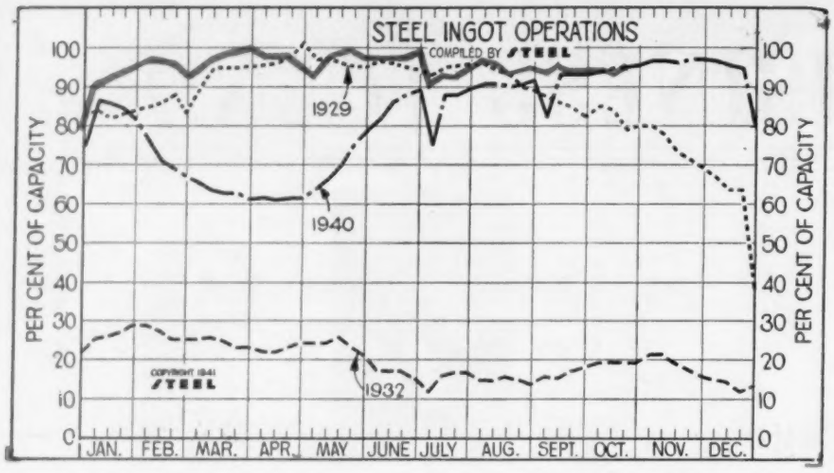
The national steel rate advanced two points to 96.5 per cent during the week ended Oct. 18, but shortage of scrap and labor unrest continue as the chief obstacles in the industry's path to reach capacity operations.


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100, WEIGHED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
(WEEKLY AVERAGE) SCALE AT RIGHT
1941
1940
1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL'S index of activity gained 2.3 points to 130.2 in the week ended Oct. 18:

Week Ended	1941	1940
Aug. 2	123.3	99.7
Aug. 9	117.5	98.4
Aug. 16	118.2	100.8
Aug. 23	118.5	101.4
Aug. 30	118.2	103.5
Sept. 6	111.8	98.7
Sept. 13	122.3	114.9
Sept. 20	122.9	124.4
Sept. 27	127.5	122.8
Oct. 4	128.0	124.4
Oct. 11	127.9	126.0
Oct. 18	130.2	128.3

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	121.1	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	.....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.8



Steel Ingot Operations

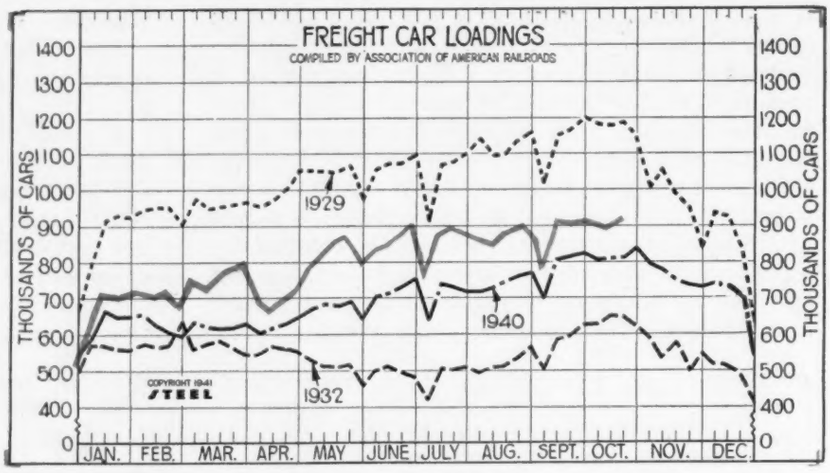
(Per Cent)

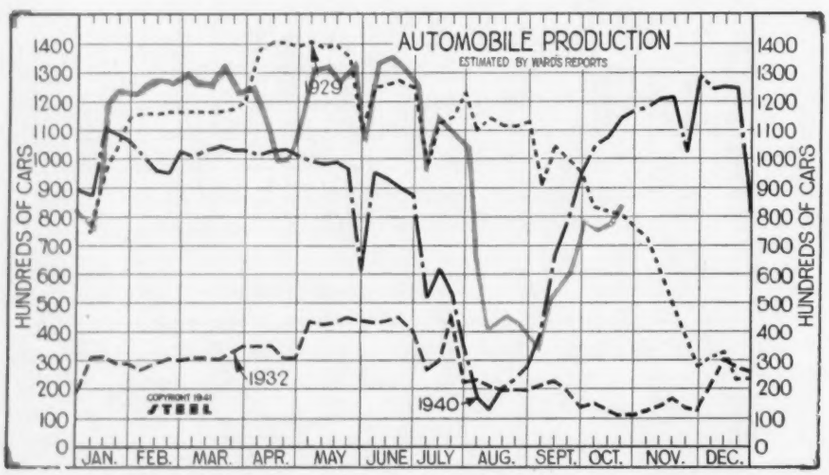
Week ended	1941	1940	1939	1938
Oct. 18....	96.5	95.0	91.0	51.5
Oct. 11....	94.5	94.5	89.5	51.5
Oct. 4....	96.0	93.5	87.5	48.5
Sept. 27....	96.0	93.0	84.0	47.0
Sept. 20....	96.0	93.0	79.5	48.0
Sept. 13....	96.5	93.0	74.0	46.0
Sept. 6....	95.5	82.0	62.0	41.5
Aug. 30....	96.5	91.5	64.0	44.5
Aug. 23....	96.0	90.5	63.5	43.5
Aug. 16....	95.5	90.0	63.5	41.5
Aug. 9....	96.0	90.5	62.0	40.0
Aug. 2....	97.5	90.5	60.0	40.0
July 26....	96.0	89.5	60.0	37.0
July 19....	95.0	88.0	56.5	36.0
July 12....	95.0	88.0	50.5	32.0
July 5....	92.0	75.0	42.0	24.0
June 28....	99.5	89.0	54.0	28.0

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
Oct. 18.....	924	814	861	706
Oct. 11.....	904	812	845	727
Oct. 4.....	918	806	835	703
Sept. 27.....	920	822	835	698
Sept. 20.....	908	813	815	676
Sept. 13.....	914	804	806	660
Sept. 6.....	798	695	667	569
Aug. 30.....	912	769	722	648
Aug. 23.....	900	761	689	621
Aug. 16.....	890	743	674	598
Aug. 9.....	879	727	665	590
Aug. 2.....	883	718	661	584
July 26.....	897	718	660	589
July 19.....	899	730	656	581
July 12.....	876	740	674	602
July 5.....	740	636	559	501
June 28.....	909	752	666	589





Auto Production

(1000 Units)

Week ended	1941	1940	1939	1938
Oct. 18....	85.6	114.7	70.1	68.4
Oct. 11....	79.1	108.0	75.9	50.5
Oct. 4....	76.8	105.2	76.1	37.7
Sept. 27....	78.5	96.0	62.8	25.4
Sept. 20....	60.6	78.8	54.0	20.4
Sept. 13....	53.2	66.6	41.2	16.1
Sept. 6....	32.9	39.7	26.9	17.5
Aug. 30....	40.0	27.6	25.2	22.2
Aug. 23....	45.5	23.7	17.5	18.7
Aug. 16....	45.6	20.5	13.0	23.9
Aug. 9....	41.8	12.6	24.9	13.8
Aug. 2....	62.1	17.4	28.3	14.8
July 26....	105.6	34.8	40.6	30.4
July 19....	109.9	53.0	47.4	32.1
July 12....	114.3	65.2	61.6	42.0
July 5....	96.5	52.0	42.8	25.4
June 28....	127.9	87.6	70.7	40.9

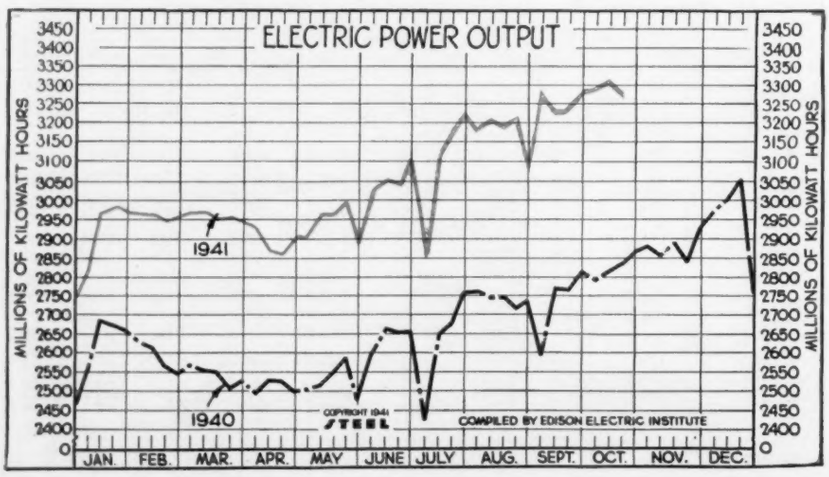
Electric Power Output

†

(Million KWH)

Week ended	1941	1940	1939	1938
Oct. 18.....	2,273	2,838	2,576	2,281
Oct. 11.....	3,315	2,817	2,584	2,251
Oct. 4.....	3,290	2,792	2,554	2,229
Sept. 27.....	3,233	2,816	2,559	2,208
Sept. 20.....	3,232	2,769	2,538	2,211
Sept. 13.....	3,281	2,773	2,532	2,279
Sept. 6.....	3,096	2,592	2,376	2,110
Aug. 30.....	3,224	2,736	2,442	2,217
Aug. 23.....	2,193	2,714	2,434	2,202
Aug. 16.....	3,201	2,746	2,454	2,207
Aug. 9.....	3,196	2,743	2,414	2,198
Aug. 2.....	3,226	2,762	2,400	2,194
July 26.....	3,184	2,761	2,427	2,160

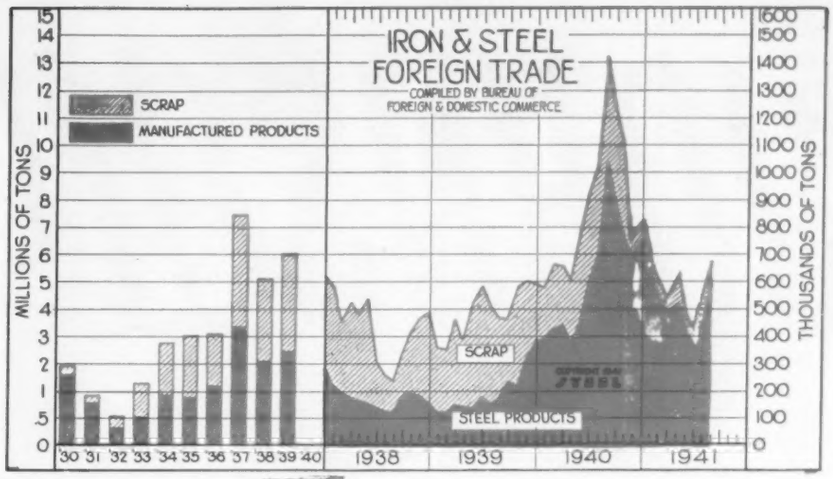
†New series: Includes additional governmental and power generation not previously reported.

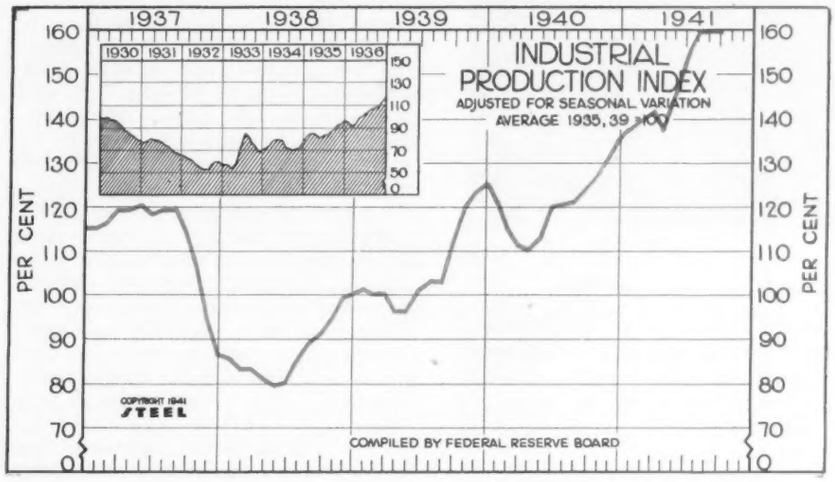

ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
1940
COPYRIGHT 1941 STEEL
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

Iron and Steel Exports

(Thousands of Gross Tons)

	Steel Products		—Scrap—		Total
	1941	1940	1941	1940	1941
Jan.	653.8	396.1	45.1	187.5	698.9
Feb.	525.9	436.6	74.4	234.7	600.2
Mar.	512.8	457.1	54.4	206.9	567.2
April	515.7	391.8	120.2	221.2	635.8
May	409.8	471.5	62.9	312.5	472.7
June	398.7	617.7	59.0	318.4	457.7
July	478.0	707.8	59.9	327.1	537.9
Aug.	617.5	1046.1	80.3	346.1	697.7
Sept.	.....	965.4	.....	251.1	.....
Oct.	.....	846.6	.....	258.5	.....
Nov.	.....	713.8	.....	74.3	.....
Dec.	.....	735.2	.....	70.0	.....
Total	.....	7,785.5	.....	2,823.1	.....





Industrial Production
Federal Reserve Board's Index

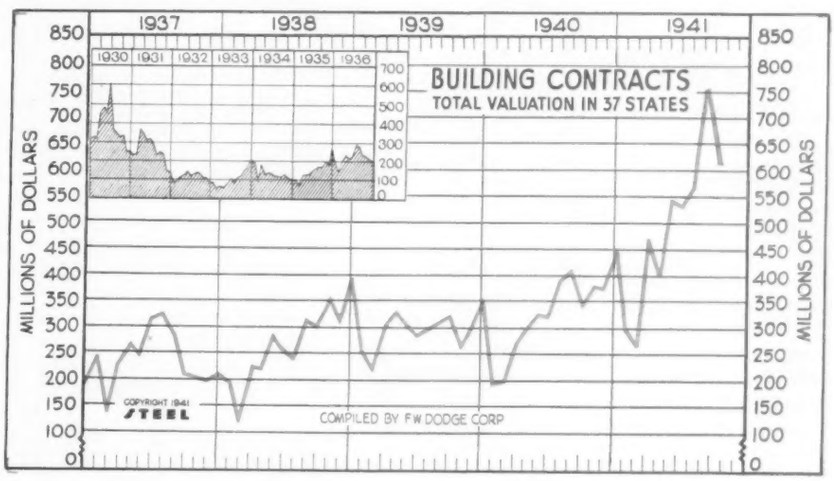
(1935-39 = 100)

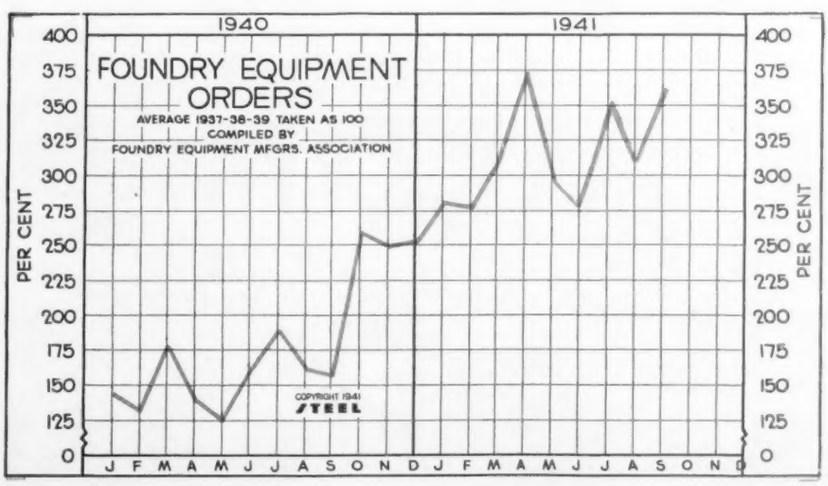
	1941	1940	1939	1938	1937
Jan.	139	122	102	86	116
Feb.	141	116	101	84	117
March	143	112	101	84	120
April	140	111	97	82	120
May	150	115	97	80	121
June	157	121	102	81	119
July	160	121	104	86	120
Aug.	160	121	104	90	120
Sept.	160	125	113	92	115
Oct.	...	129	121	95	107
Nov.	...	133	124	100	95
Dec.	...	138	126	101	87
Year Ave.	...	122	108	88	113

Construction Total Valuation
In 37 States

(Unit: $1,000,000)

	1941	1940	1939	1938	1937
Jan.	$305.2	$196.2	$251.7	$192.2	$242.7
Feb.	270.4	200.6	220.2	118.9	188.3
Mar.	479.9	272.2	300.7	226.6	231.2
April	406.7	300.5	330.0	222.0	269.5
May	548.7	328.9	308.5	283.2	243.7
June	539.1	324.7	288.3	251.0	317.7
July	577.4	398.7	299.9	239.8	321.6
Aug.	760.3	414.9	312.3	313.1	281.2
Sept.	623.3	347.7	323.2	300.9	207.1
Oct.	.....	383.1	261.8	357.7	202.1
Nov.	.....	380.3	299.8	301.7	198.4
Dec.	.....	456.2	354.1	389.4	209.5
Ave.	.....	$333.7	$295.9	$266.4	$242.8


1937 1938 1939 1940 1941
1930 1931 1932 1933 1934 1935 1936
BUILDING CONTRACTS
TOTAL VALUATION IN 37 STATES
MILLIONS OF DOLLARS
COPYRIGHT 1941 STEEL
COMPILED BY F.W. DODGE CORP


1940 1941
FOUNDRY EQUIPMENT
ORDERS
AVERAGE 1937-38-39 TAKEN AS 100
COMPILED BY
FOUNDRY EQUIPMENT MFGRS. ASSOCIATION
PER CENT
COPYRIGHT 1941 STEEL
J F M A M J J A S O N D J F M A M J J A S O N D

Foundry Equipment Orders

Monthly Average

(1937-38-39 equals 100)

	1941	1940
Jan.	285.3	149.0
Feb.	281.1	135.7
March	315.2	183.2
April	377.2	145.2
May	298.7	129.1
June	281.1	164.9
July	358.1	194.4
Aug.	312.9	165.4
Sept.	363.8	161.2
Oct.	....	264.0
Nov.	....	254.2
Dec.	....	257.8

The JOHNSON semi-automatic RIFLE

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
and
Contributing Editor, STEEL

. . . . the problem of hammer design and control; War Department specifications and how they are met; can the bolt unlock prematurely; calculations of frictional resistance to rotation of the bolt, of axial forces necessary to operate unlocking cam, of velocity of recoiling barrel, of distance bullet is from muzzle when bolt commences to unlock, of forces acting on the barrel

This Is Number 35 in a Series on Ordnance and Its Production, Prepared for STEEL *By Professor Macconochie*

(Concluded from Last Week)

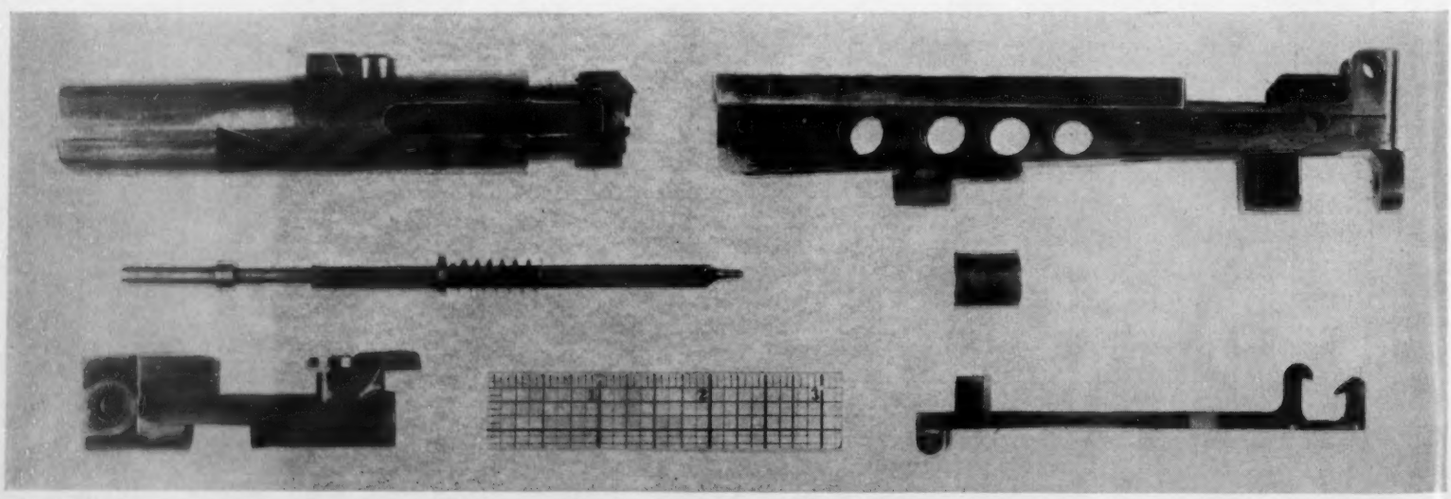
■ THE BOLT assembly of the Johnson rifle includes the bolt proper, a cylindrical element 0.875-inch in diameter and 5 inches long as shown at 75 X, Fig. 10. Then there is the sliding element 76 X embodying the locking cam; the extractor 79; the firing pin 77 X; T-piece 78; firing pin spring 88; and two roller bearings. The bolt is bored out inside to accommodate the firing pin and the locking cam element, including the T-piece. The extractor consists of an extractor claw, guide lip and leaf. It fits snugly into the slot provided in the side of the bolt with which, of course, it rotates.

The operating handle R-81 X fits into a T-slot over the extractor and locks it in place, the spindle in the handle dropping into the hole seen in the tail of the extractor and into a corresponding hole in the bolt. The locking cam element is bored to suit the firing pin as seen in Detail C, Fig. 9, and at 76 X, Fig. 10; and is also drilled at the rear to accommodate the pin through the forked end of the strut 85. There is also an opening on the underside for the safety piece which prevents the forward movement of the firing pin until the bolt is securely locked. The reason for forking the strut 85 is, of course, to permit the hammer, Detail F_2, Fig. 9, to swing through it. The strut pin is kept in place by the firing pin which slides in a milled notch in the former. The use of the firing pin spring 88 is optional.

A little consideration will show that the firing pin cannot remain exposed and so cause premature ignition since the separation of the bolt proper from the locking cam element during unlocking causes retraction of the pin independently of the firing pin spring. This is a positive action which could only fail by fracture of one or more of the parts involved. The rollers mounted in juxtaposition to the camming elements bear on the slot milled in the receiver and may be dispensed with. Their presence facilitates the action of the bolt. Altogether there are 14 parts in the bolt assembly.

The group of parts associated with the receiver includes the barrel return spring—Details L and L_1, Fig. 9 and 8 X, Fig. 10—whose latch engages with the lug on the underside of the guide collar on the barrel 210; the ejector, Detail E, located on the left side of the bolt and designed to kick out the spent case through the port in the receiver at an angle of 45 degrees; bolt stop plate 3 X and bolt stop 2 which sit in the rear of the receiver and take the shock of the recoiling bolt on a

Fig. 12—Closeup views of parts of the Johnson, including bolt unlocking cam, firing pin sear, hammer, block, etc. All are shapes easily manufactured



rubber pad mounted on the rear surface of the plate; and magazine, Details J and J_1, Fig. 9, which holds 10 rounds. Holes are bored in the forward part of the receiver as seen in Fig. 10 to permit more rapid cooling of the barrel and so also to prevent the receiver from becoming uncomfortably warm. The overall length of the receiver is about 20 inches, the barrel portion being 9½ inches long.

The design of the hammer for a rifle presents certain problems peculiar to itself. First it is desirable to arrange matters so that the greatest pressure due to the hammer spring occurs at the instant of firing. An examination of Details F, F_1 and F_2 will show that the moment of the pressure of the spring is least when the hammer is cocked and greatest with the hammer in the striking position. Again, provision must be made against the possibility of the failure of the hammer to cock should the operator keep his finger on the trigger. In that event the lower lip will engage the forward sear until release of the trigger when the lower lip will free itself and the upper engage with the rear sear, in readiness for action.

The hammer plate, best seen in Detail R-50 X, fits into grooves in the receiver and mounts the hammer 53; hammer strut 55; spring 57, sear, Fig. 9; trigger, and sear spring. The sear is set in a slot in the bot-

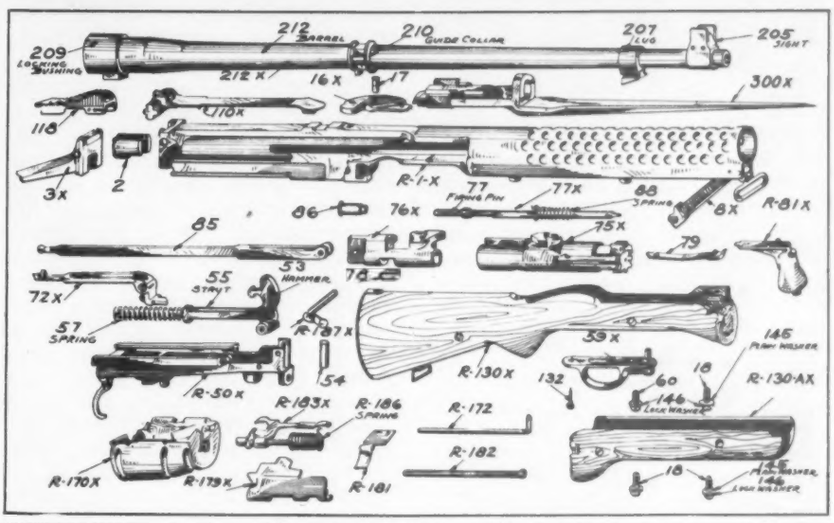
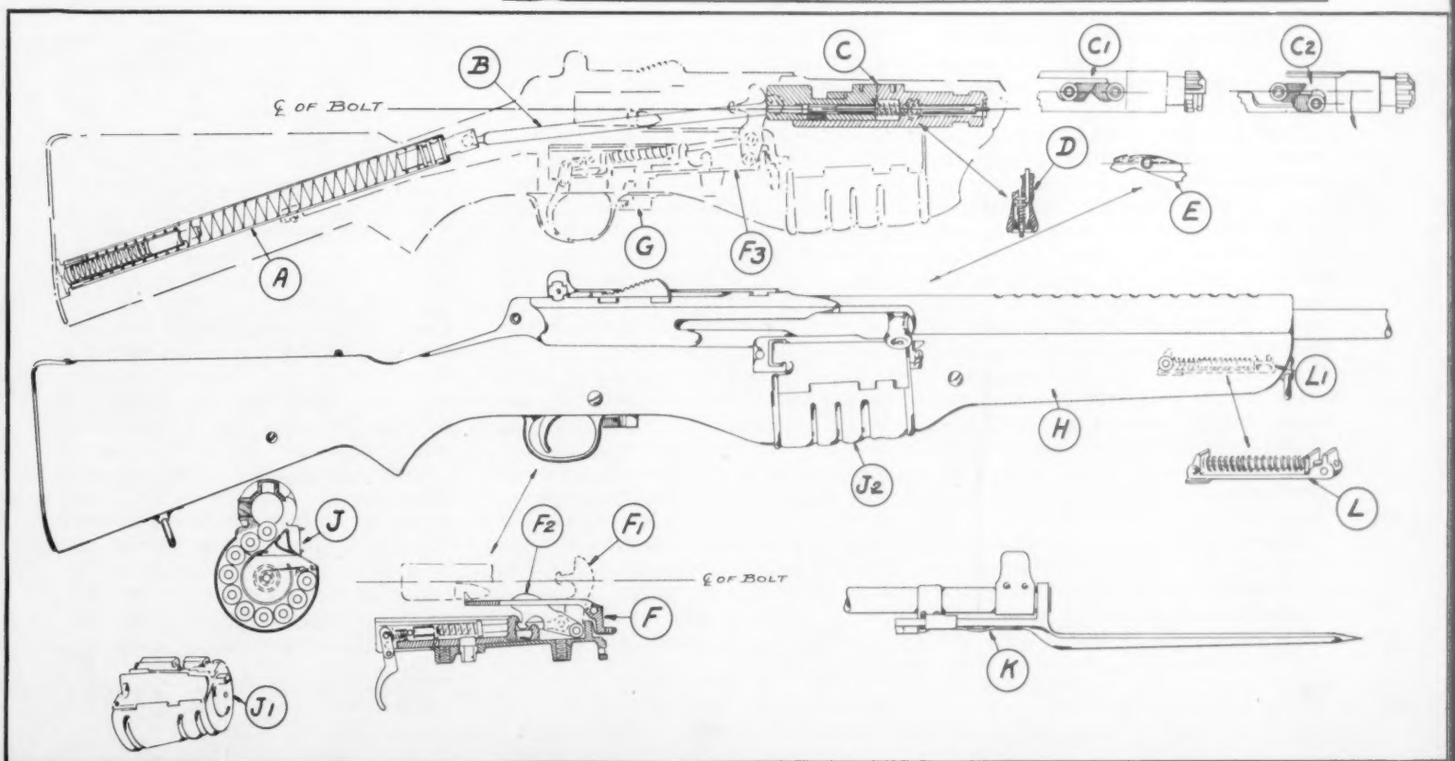


Fig. 9. (Bottom view)—Diagrammatic outline of essential parts of the Johnson. For detailed explanation, see text here and in last week's issue

Fig. 10. (Center view)—Detailed sheet of parts for the Johnson rifle

Fig. 13. (Top view)—The inventor, Capt. Melvin M. Johnson Jr., and his rifle



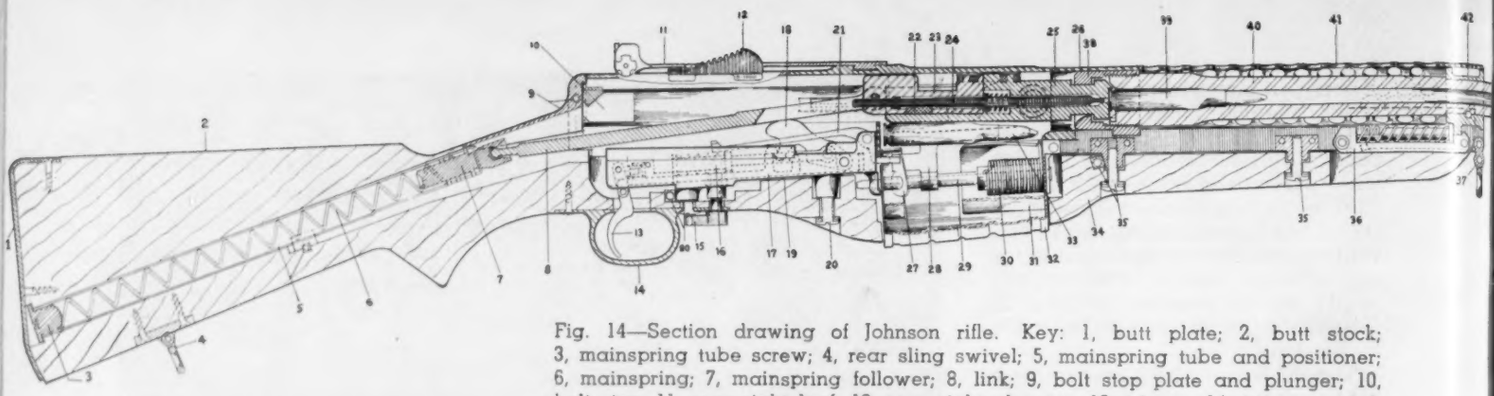


Fig. 14—Section drawing of Johnson rifle. Key: 1, butt plate; 2, butt stock; 3, mainspring tube screw; 4, rear sling swivel; 5, mainspring tube and positioner; 6, mainspring; 7, mainspring follower; 8, link; 9, bolt stop plate and plunger; 10, bolt stop; 11, rear sight leaf; 12, rear sight elevator; 13, trigger; 14, trigger guard; 15, safety; 16, hammer strut and spring; 17, sear; 18, hammer; 19, hammer block; 20, rear stock screw, hammer block screw and butt stock recoil stop; 21, bolt catch; 22, firing pin stop; 23, locking cam unit; 24, firing pin; 25, bolt and unlocking cam; 26, receiver; 27, bolt catch cam; 28, magazine follower; 29, magazine center shaft; 30, magazine follower spring; 31, magazine core; 32, magazine body; 33, top carriage positioned in feed lips of magazine follower; 34, fore stock; 35, fore stock screws and recoil stop; 36, barrel latch and recoil spring; 37, front sling swivel; 38, barrel locking bushing; 39, cartridge in chamber; 40, barrel; 41, radiator sleeve; 42, barrel guide collar; 43, bayonet lug; 44, front sight

tom of the hammer plate and has an extension which is connected to the trigger by a pin. As the trigger is squeezed, the sear disengages from the lip on the hammer, the hammer spring drives the hammer against the firing pin, which now protrudes from the rear of the locking cam element, and the cartridge is fired.

Component F, Fig. 9, and marked 72 X in Fig. 10, is designed to hold the bolt open after firing the last cartridge in the magazine. This part operates on a cam mounted on the rear end of the magazine follower shaft seen in Detail J. As the last cartridge leaves the magazine, the foot drops and the V-catch rises, catching a recess in the underside of the bolt. In order to load after firing a burst from the magazine, the operating handle must be grasped and pulled back perhaps a sixteenth of an inch to release the catch, allowing the bolt to move forward thereafter into the locked position, carrying the first cartridge with it.

Rifle Easily Manufactured

The stock assembly consists of the butt stock shown at R-130 X and forestock R-130 AX; together with a mainspring tube seen in Detail A, Fig. 9; spring; plunger; and plug—all located in a hole bored from tang to butt. Also included in this assembly are the trigger guard and two stock screws, one of which enters the receiver and the other the hammer plate.

The operation of charging the 10-round capacity rotary magazine is shown in Fig. 11. The bolt may be open or closed during the process, or the magazine may still have cartridges in it. The hinged magazine cover is located just below the ejection port, being equipped with clip seats into which the clip is inserted horizontally. The cartridges are then stripped from the clip and pressed into the magazine with the even, steady pressure of the thumb of the right hand in a counter-clockwise direction—that is, in the opposite direction to that in which they feed.

War Department specifications governing the characteristics desired in semi-automatic rifles include the requirement that they must function with standard .30-caliber ammunition. It is of interest to note that the Johnson rifle performs satisfactorily with various types of .30-caliber ammunition producing chamber pressures all the way from 38,000 to 68,000 pounds per square inch.

Ease of manufacture is another important feature. Fig. 12, a close-up of several of the more intricate parts including the bolt, the firing pin, locking cam element, sear and hammer block, should be studied. Other recommendatioins suggest the desirability of limiting the number of parts and of making those parts requiring cleaning easy to dismount. The writer watched Captain Johnson stick the nose of a bulleted round into the forestock and press the pin which holds the barrel latch in position. After giving the barrel a push so that the latch swung outward, he shook the barrel out of its housing onto the floor. Most of the other assemblies give equally little trouble.

The mechanism must be so designed as to preclude the possibility of injury to the operator due to premature unlocking. We are tempted to ask whether under any conceivable circumstances the bolt of the Johnson rifle could become unlocked while any considerable pressure remained in the barrel. Admittedly in any attempt at analysis we are faced with certain unknown factors; but at least it is not impossible to determine the *order* of the quantities involved in our equations.

When the barrel pressure is a maximum, if we assume that the cartridge case offers no support and that the total rearward thrust of the gases is borne by the bolt, we have two frictional torques to consider—namely that between the head of the case and the bolt, and that between the bolt lugs and the abutments. The first of these is given by:

$$2/3\ (3.1416)\,y.p.R^3$$

in which y is the coefficient of abrasive friction, p is the unit pressure on the face of the bolt, and R is the radius of the head of the cartridge case. As nearly as y can be approximated for pressures of this order, and taking the average maximum pressure for different classes of ammunition, this works out to be about 0.19-ton-inch.

The second frictional torque is obtained from:

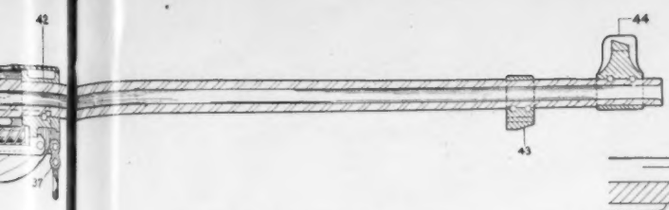
$$(3.1416)\,D^2/4.y'p.R'$$

in which y′ is once more the coefficient of abrasive friction—this time between steel and steel; p is the unit pressure on the face of the bolt due to the exploding gases, and R′ is the mean radius of the faces of the bolt lugs; D is the diameter of the head of the case. This works out to be 0.66-ton-inch.

Now it may be recalled that the slope of the face of the unlocking cam is 40 degrees. It should also be observed that the reaction from the face of the receiver slot will tend to relieve the pressure on the locking lugs (but not, of course, on the face of the bolt). We may, therefore, write an equation which will give us the barrel thrust necessary to unlock if certain assumptions are made in order to simplify our calculations but not materially alter the result.

Considering the equilibrium of the bolt, let an axial thrust of P′ tons be applied to the face of the unlocking cam. Clearly if this reaction arises from deceleration of the moving barrel, the pressure between the locking lugs and the barrel extension abutments will be diminished by this amount. Hence, equating torques acting on the bolt, we have:

Resisting friction torque of cartridge case head and face of bolt plus resisting friction torque of locking lugs, must be equal to the torque applied by the component of the reaction of the cam slot in the receiver acting tangentially to the bolt. Stated algebraically,



0.19 plus (P—P')y'.R' equals P' cot 40°.R''

in which R'' is the distance of the point of application of the thrust on the unlocking cam from the axis of the bolt. Thus:

P' equals (0.19 plus P.y'R')/(y'R' plus cot 40°.R'')

The result is 0.43-ton.

This is the pressure which would have to be exerted by the recoiling barrel, while the gas pressure was a maximum, in order to unlock the bolt. By way of making a first comparison between this figure and the inertial thrust of the bullet and the expanding gases while still in the barrel, we note that the rearward thrust of the recoiling barrel will be equal to the pressure required to accelerate the bullet and the gases (which on the average, we may suppose, are traveling at half the velocity of the bullet at any instant) less the pressure of the spring used to restore the barrel to "battery" and the main spring acting through the bolts.

For the sake of simplicity we will deal with the average value of the acceleration: From P equals m.a, we have $\frac{175}{7000 \times 32.2} \cdot \frac{2700}{0.0012} \cdot \frac{1}{2000}$ equals 0.873-ton.

The mass involved is taken as that of the bullet and half of the powder charge. The muzzle velocity is taken as 2700 feet per second; and the time of flight through the barrel is obtained from a knowledge of the length traversed (25.78 inches) and the assumption that the average velocity is two-thirds of the muzzle velocity.

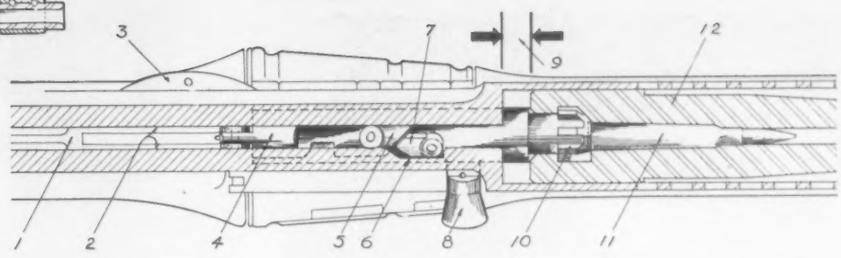
At the end of action, when the bullet is just leaving the muzzle, the velocity of the barrel will be given by

P.t/M

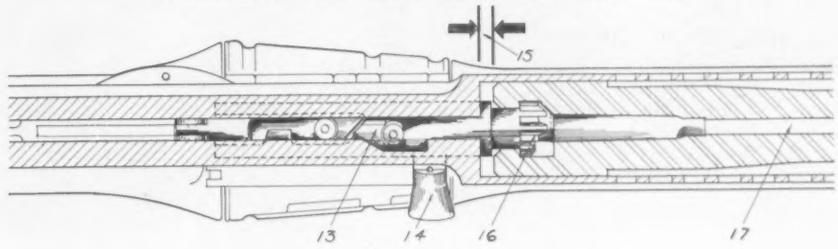
in which M is the mass of the recoiling barrel and bolt (4.125 pounds); P is the pressure (above); and t is the time of flight through the barrel. This works out at 16.3 feet per second.

At about 3/16-inch from the beginning of the stroke of the barrel, the bolt commences to unlock. Meantime, while the barrel has traveled 0.187-0.156-inch (the latter figure being the distance traveled by the barrel during the passage of the bullet) the bullet has moved, $\frac{0.031}{12} \cdot \frac{1}{16.3} \cdot \frac{2700}{1}$ equals 0.428-foot, or between 5 and 6 inches.

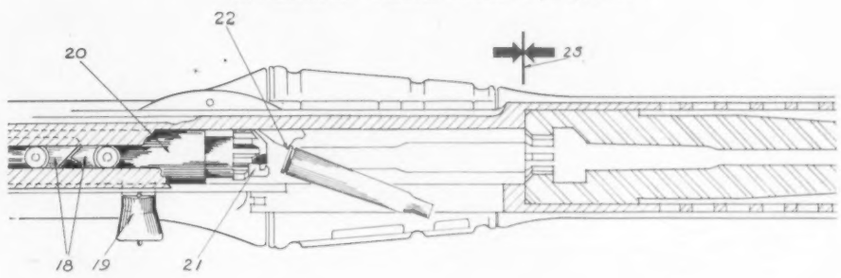
This figure is not exactly in accord with the high-speed camera observa-



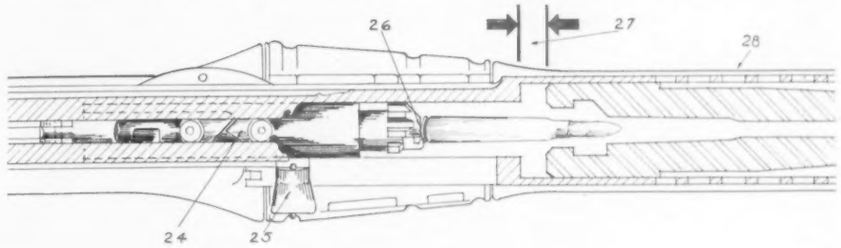
A. Action closed on loaded cartridge - Gun ready to fire.



B. Gun fired - Recoil stroke in progress.



C. Recoil stroke completed. Bolt fully retracted and mainspring compressed.



D. Bolt closing from pressure of mainspring.

Fig. 15—Explanation of operating cycle of Johnson short recoil action. Key: 1, link connecting action with mainspring in buttstock; 2, camming groove; 3, ejector seat; 4, rear locking cam lug; 5, rear locking cam; 6, cam chamber; 7, front locking cam; 8, detachable operating handle of bolt; 9, barrel in firing position . . . recoil travel is 3/8-inch; 10, locking lugs of bolt engaging lugs of barrel locking bushings; 11, loaded cartridge in chamber; 12 barrel slidably mounted in radiator sleeve; 13, forward locking cam raising bolt to unlocked position by action of camming groove during rearward movement; 14, handle rising to unlocked position . . . movement 20 degrees; 15, barrel partly recoiled in its mounting; 16, locking lugs of bolt partly disengaged from barrel locking bushing; 17, chamber pressure dropping as buttel travels out of barrel; 18, cams in line in camming groove . . . fully unlocked position; 19, bolt handle raised 20 degrees to unlock position; 20, bolt and locking cam fully retracted; 21, extractor claw has pulled cartridge out of chamber; 22, ejector strikes base of empty cartridge, throwing it out of receiver; 23, barrel in fully recoiled position; 24, at end of forward stroke, bolt is rotated to its locked position by pressure of rear locking cam which will seat forward locking cam in cam chamber, thus rotating bolt 20 degrees to right . . . refer A for complete cycle; 25, bolt handle remains in raised position until relocking commences; 26, bolt face picks up loaded cartridge from feed lips and chambers it; 27, barrel has returned to firing position; 28, barrel radiator sleeve provides slidable mount for barrel which is supported at rear by barrel locking bushing, and by barrel guide collar 10 inches forward from this point

Fig. 11. (Upper view)—Charging from the clip

Fig. 16. (Lower view)—Demonstrating how parts of Johnson rifle occupy such small space as to be suitable for packing into a canvas roll with one strap for mounting on soldier's chest or back for parachute operations. Gun can be assembled in 30 seconds

tions to which reference was made in Part I last week. However, it may be pointed out that we are here dealing with extremely small intervals of time and that the absolute error involved is of minute dimensions. No account was taken in our calculations of barrel friction and the pressure of the springs. Both of these factors would have the effect of shortening the travel of the barrel before emergence of the bullet and thus of increasing the distance between the muzzle and the bullet at the instant unlocking begins, but hardly enough, perhaps, to increase this figure to 2 feet.

These tentative calculations demonstrate very clearly, whether they be very close to the truth or not, that it is only necessary to regulate the distance the barrel must travel before unlocking begins, to give a very positive guarantee against premature unlocking. With a sufficient margin of safety, only a large increase in muzzle velocity or a considerable reduction in the mass of the barrel and bolt could bring about premature contact of the unlocking cam with the camming face of the receiver slot.

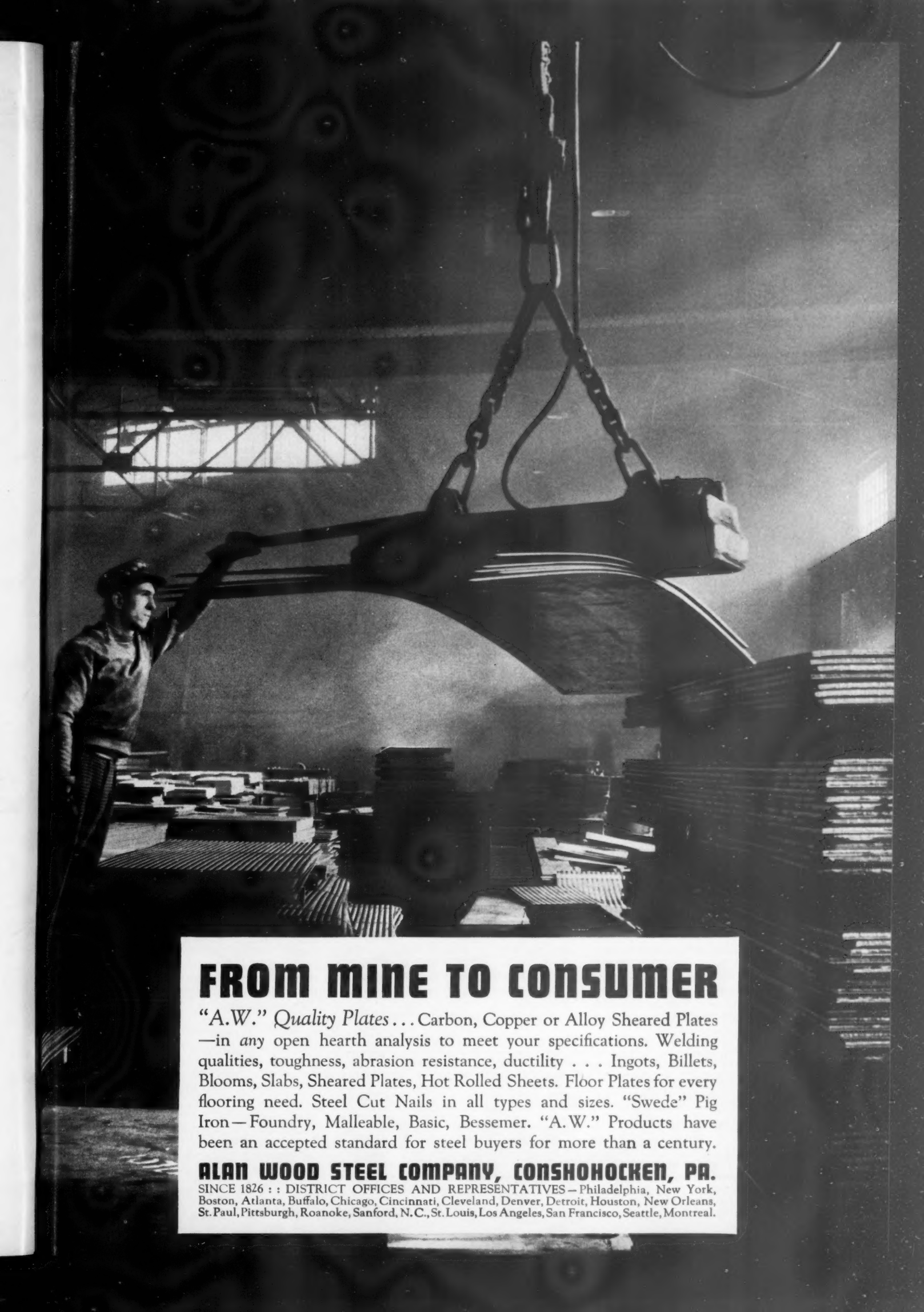
These figures also establish the order of magnitude of the forces required to unlock the bolt at maximum pressure and indicate the adequacy of the rearward thrust of the reaction to the pressure producing acceleration of the bullet and the expanding gases, to provide such a force—at least in the earlier stages of the passage of the bullet through the barrel.

Since there are certain prevalent misconceptions concerning the forces acting on the barrel of a rifle during discharge of the piece, it may be as well to point out that in addition to the bursting action of the exploding gas (which normally produces no other result than a stressing of the walls of the barrel), there is a rearward pressure which is only partly balanced by the friction of the projectile against the rifling, the remainder being absorbed by the inertia of the barrel and its elastic supports. This rearward thrust is always equal to the product of the rate of change of the velocity of the bullet (acceleration) and the *mass* (i.e. the mass in pounds divided by "g") of the bullet and the gases. There is also a torque arising from the spin given to the bullet in flight; but this has no immediate interest. The sudden elimination of the frictional resistance of the barrel to the movement of the bullet as it leaves the muzzle is the principal cause of the sudden "kick" at this point.

Other War Office requirements included the amount of the trigger pull (3 to 5 pounds); weight (not to exceed 9½ pounds); accuracy to be comparable with the present shoulder rifle; stock should be so ventilated that 2400 rounds may be fired in less than 1½ hours without charring or overheating the wood; rifle to be capable of functioning by hand in case the self-loading feature should be disabled; no special oil or grease must be required; and no special tools required for dismounting or assembling. As far as the writer's investigations of the reports and other evidence having a bearing on the manner in which the Johnson semi-automatic rifle meets these requirements go, there would appear to be a very close correlation indeed between specifications and characteristics. The gun should give a good account of itself.

Fig. 16 gives some idea of the small space into which the parts of the Johnson rifle can be made to fit, as in the bundle of a parachute trooper. The "sky" soldier is apt to break his leg if required to carry a lengthy arm. With his automatic rifle made into a bundle and strapped to his back or the chest, he would have both hands free to save himself from injury. The group of parts shown can be assembled in 30 seconds.

Fig. 14 shows sectionalized drawing of the Johnson gun with the various parts identified. Fig. 15 reveals the four basic steps in the operating cycle of the Johnson short recoil action.



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BERYLLIUM

. . . . . its present field and possible future applications

By LOUIS L. STOTT
Vice President
Beryllium Corp. of America
Reading, Pa.

Springs and diaphragms have been the largest outlets for beryllium copper but increasing amounts of the alloy are being consumed for parts subjected to wear and shock. Here are few of both types

■ BERYLLIUM has found it difficult to dissociate itself from some of the bizarre statements made during the past 20 years regarding its properties. A recent article by a prominent government official speaks of beryllium as a "magic metal". One of the country's leading newspapers reported a few months ago that any prospector finding a deposit containing 500,000 tons of recoverable beryllium ore could get a check for a million dollars from some airplane factory owner.

As a matter of fact, beryllium does possess an unusual combination of properties. As an alloy of copper, it is well established as a commercial product for a growing list of applications. The metal's limitations—if not its full possibilities—appear already well established.

Properties of Beryllium: The metal is steel gray in color and not readily tarnishable. It is lighter than aluminum, with a specific gravity of 1.8—close to that of magnesium. Beryllium's calculated modulus of elasticity is about 30 per cent higher than that of steel, and its electrical conductivity is about one-twelfth that of copper.

It has great affinity for oxygen, nitrogen, sulphur and carbon. Hardness varies with purity of the metal, readings of 120 to 140 brinell being reported on 99.8 to 99.9 per cent pure metal. The melting point is 2350 degrees Fahr.; thermal expansion is near that of iron. It is nonmagnetic.

How It is Used: Pure beryllium still is more or less a relatively expensive laboratory curiosity, its commercial applications to date in the pure form having been limited principally to industrial X-ray tubes, where small quantities of cast and ground plates have proved useful, due to the transparency of the metal to X-rays. Commercially prepared metal of 99.5 per cent purity appears lacking in sufficient malleability to be considered as a structural material. Hence it is in alloy form, rather than as a pure metal, that beryllium finds its greatest use.

Alloys with Nonferrous Metals: Partly because of its light weight, early investigations sought to alloy beryllium with aluminum and magnesium, but such compositions still are very much in the laboratory stage. Actually, its low specific gravity is not one of beryllium's more important properties. While high tensile strengths have been obtained in beryllium aluminum alloys containing as much as 70 per cent beryllium, the material has proved to be too brittle and too expensive.

It must be remembered that while beryllium copper—the principal outlet for beryllium today—sells for $15 a pound of **contained** beryllium, the pure metal, or beryllium contained in aluminum, sells at $45 or $50 a pound. Reason for the difference in costs is that methods have been developed for quantity production of beryllium copper alloys directly from beryllium oxide, thereby making it unnecessary first to produce pure beryllium.

Cost of producing a high-beryllium alloy of aluminum at present would limit its application, although investigations indicate there may be possible uses of beryllium as a stiffener of aluminum or aluminum alloys when the application warrants the high cost. At the same time, it seems likely that with a reasonably broad market for pure beryllium, its production cost could be lowered to about one-half its present level, with a corresponding

TABLE I—Effect of Heat Treatment on Physical Properties of 2% Beryllium, 0.2% Cobalt, Balance Copper

	Tensile Strength (psi)	Yield Point (.2% psi)	Proportional Limit (psi)	Elongation (% in 2")	Modulus of Elasticity (millions)
Annealed Soft	66,000	26,000	18,000	50	18
Heat Treated	175,000	146,000	86,500	8	19
Rolled 2 Nos. Hard	192,000	173,000	118,500	4	18.1
Rolled 4 Nos. Hard	200,000	179,000	105,000	3	17.9

TABLE II—Properties of 1.8% Beryllium Copper With 0.13% Cobalt Added Cold drawn 40%, And Heat Treated 3 Hours at 700° Fahr.

Ultimate tensile strength	158,200 psi
Elongation in 2 inches	20%
Reduction in area	29%
Hardness	33 rockwell C
Specific gravity	8.35
Stress weight ratio	525 kiloinches

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Parts of beryllium copper are formed easily in relatively soft temper, and then are given high spring properties by a simple one-step low-temperature heat treatment

reduction in the selling price of beryllium aluminum.

Contrary to popular belief, the ore supply is not one of the important factors in either the cost or lack of use of this metal. Beryl, the only commercially available beryllium ore, is obtained from the far west and South America. Because of the highly refractory nature of beryl, the extreme reactivity of the metal at elevated temperatures and the number of process steps required, production of metallic beryllium is accomplished with a low over-all efficiency.

Although five different analyses of beryllium copper commonly are sold, about 80 per cent of the alloy consumed today contains about 2 per cent beryllium. With this small addition, copper can be hardened by cold work and heat treatment to more than six times its normal annealed strength. Beryllium copper wire has been drawn to an ultimate tensile strength as high as 220,000 pounds per square inch. Hot-forged cold chisels of beryllium copper, containing 3.5 per cent beryllium, can be hardened to 48 rockwell C. An important advantage in using tools made of this material is that they will cause no spark which might prove dangerous where inflammable fumes or materials are present.

Replaces Phosphor Bronze: Beryllium copper was introduced in 1931, primarily as a competitor of phosphor bronze for springs and diaphragms of all kinds. This alloy contained 2 to 2.25 per cent beryllium and the balance copper. More recently it has been found that improved properties for certain uses can be obtained by the addition of small amounts (about 0.25 per cent) of other ingredients, principally cobalt. Such alloys combine high electrical conductivity with high tensile properties and hardness. A further advantage is their ability to be formed in relatively soft temper, and then be given high spring properties by a simple one-step low-temperature heat treatment. This latter characteristic has in many cases enabled engineers to simplify designs by substituting an intricately formed and heat treated beryllium copper part for a duplex assembly consisting of a copper base alloy for current carrying capacity, backed up with steel for the spring action—springs for motor brushes are possibly the most familiar example.

TABLE III—Properties of Hot Forged and Heat Treated 1.88% Beryllium Copper with 0.25% Cobalt

Ultimate tensile strength	144,500 psi
Elongation in 2 inches.	13%
Reduction in area.....	13.5%
Hardness	31½ rockwell C
Stress weight ratio....	479 kiloinches

The marked effect on the tensile strength of beryllium copper through heat treatment and cold work is one of the major properties of the alloy. This influence is indicated by Table I. Beryllium copper strip and wire generally are furnished the consumer in a lightly cold-rolled or annealed condition, so that the material can be formed in a relatively soft temper and then given the final hardening treatment. Thus, wire for helical springs, etc., has been furnished at tensile strengths in the order of 90,000 to 120,000 pounds per square inch, being dependent on subsequent age hardening to obtain the desired tensile strength of 180,000 to 220,000 pounds per square inch.

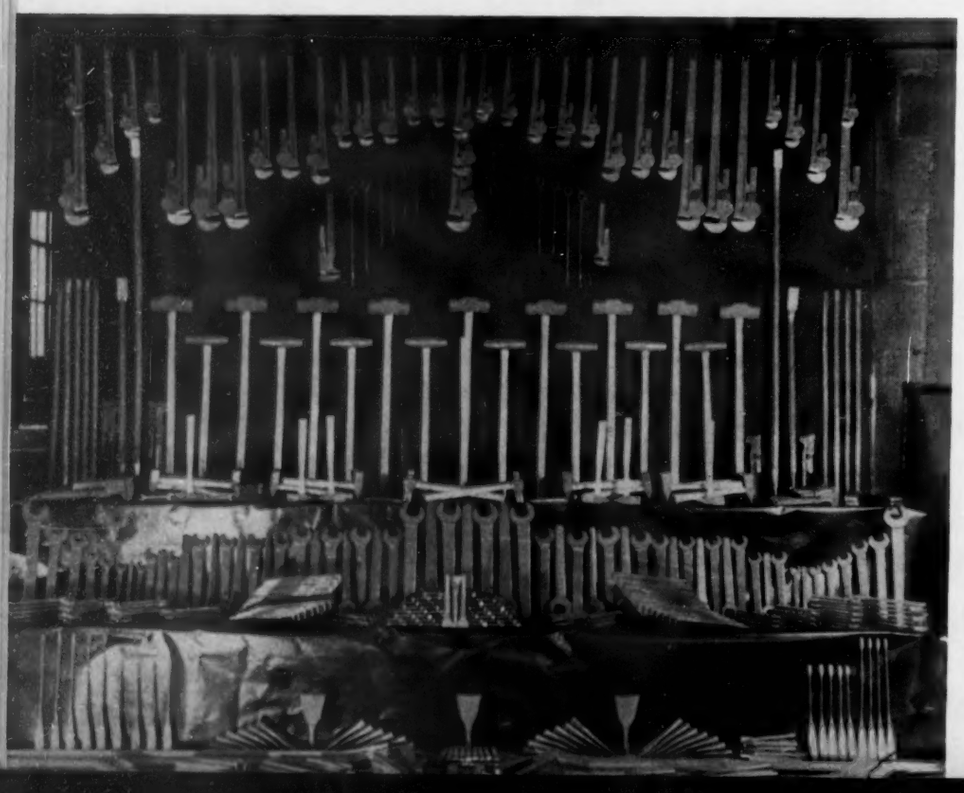
TABLE IV—Properties of 2% Beryllium, 98% Nickel Alloy

	Tensile Strength (psi)	Yield Point (psi)	Young's Modulus (millions)	Elongation (% in 2")	Brinell Hardness
Annealed soft (quenched).....	114,000	52,000	24.9	38.0	140
Heat treated (5 hours at 480 degrees Cent.)	191,000	142,000	26.0	8.4	365
Cold rolled (50% reduction)...	179,000	144,000	25.6	4.1	350
Heat treated from cold rolled..	270,000	238,000	27.0	8.8	480

Heat Treatment Valuable: Should it prove impossible to give a subsequent heat treatment operation, wire may be obtained which has high tensile properties in the condition as received. For this purpose beryllium copper wire has been developed containing 1.8 to 2 per cent beryllium, with approximately 0.2 per cent cobalt added. In manufacture, this wire is given a special precipitation hardening heat treatment instead of the last anneal, and then it is cold drawn to the final gage. Such wire has a tensile strength near 175,000 to 200,000 pounds per square inch as received with an unusually high endurance limit.

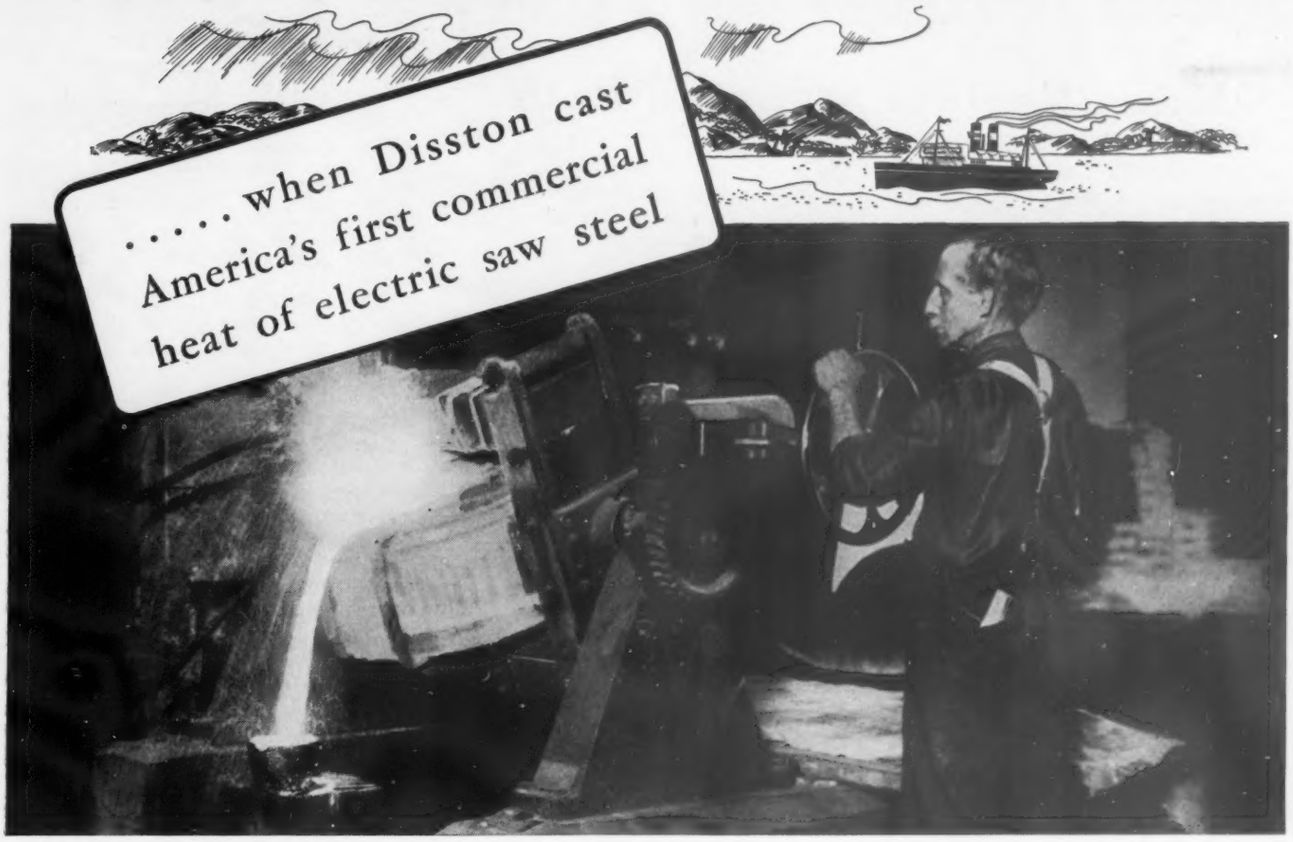
One of the retarding factors in consideration of beryllium copper for structural use has been the relatively low elongation (2 to 3 per cent in 2 inches) of the 2 per cent alloy when heat treated to the highest hardness. It has been found, however, that by lowering the beryllium content to approximately 1.8

(*Please turn to Page* 92)



Typical hand tools made of beryllium copper. In addition to being wear and shock resistant, the metal is nonsparking—an important consideration where explosion and fire hazard is present

Goethals hadn't reached Panama



A group of eager metallurgists gathered around a small, crude electric furnace in 1906. A workman turned a wheel, the furnace poured out white-hot metal . . . the first commercial heat of electric saw steel cast in America . . . made by Disston.

Today, Disston's pioneering in the manufacture of high grade steels continues. And today's metallurgical controls are so precise that electric steel properties have been vastly improved. Alloys of seven or eight elements can be added and controlled within close limits at the Disston Steel Works . . . grain size is pre-determined . . . greater soundness and cleanliness are achieved.

So Disston has been able to produce such superior tool steels as Croloy . . . highly resistant to both sliding and impinging wear, with good air hardening qualities . . . *proved* excellent for dies, punches and many high-production tools.

Help for tool makers: Disston engineers and metallurgists will be glad to help you in selecting the best tool steels for each job . . . to get more "mileage" per tool. Also, there's valuable information in the illustrated 73-page catalog, "Disston Tool Steels." If you haven't received your copy, write today to Henry Disston & Sons, Inc., 1026 Tacony, Philadelphia, Pa.

Croloy earns blue ribbons the hard way

Croloy, produced under U. S. Patent 1,695,916, is a chromium-vanadium-molybdenum alloy steel which has won "blue ribbons" in the Disston plants and elsewhere during many long production runs . . . in such applications as punches, dies, swaging mandrels, gauges, shear blades, wearing parts, slitting cutters and planer knives. Croloy is readily air hardened and is outstanding for its high resistance to both sliding and impinging wear.

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DISSTON TOOL STEELS

ELECTRO-TINNING

Using Sodium Stannate Bath

By S. BAIER
International Tin Research and Development Council
Middlesex, England

■ TIN coatings have in the past been obtained almost exclusively by immersing the base metal in a molten tin bath. During the past decade, however, the process of electrodeposition has been increasingly adopted. This process makes possible a thin and uniform coating even on articles of irregular and uneven surface.

For certain types of work electrotinning has the following features:

1—Plating is a reliable means of applying a coating of definite and uniform thickness within accurate limits. As an example, automobile pistons, knuckle bolts, etc., are tinned and used without subsequent machining.

2—Coatings of as much as 0.003 to 0.005-inch can easily be built up, whereas it is difficult by hot dipping to get a thickness greater than 0.001-inch. For special purposes coatings up to 0.125-inch have been produced without difficulty. Plating has been used to provide surfaces which form a joint without a gasket or to provide a protective coating which will be assured of a long life.

3—Tin-plating baths, and especially sodium stannate solutions, have reasonably good throwing power and provide excellent means of applying a uniform protective coating to complicated components after fabrication. For example, valves on milk vessels and the cooling units of refrigerators can be plated in one process, whereas any other finish would entail the separate treatment of a number of individual components prior to assembly.

4—Thin coatings can be applied which, although possessed of limited protective properties, provide an exceedingly economical protection for delicate metallic parts during periods of storage.

Three types of baths are in use, namely, the stannate, the stannous chloride-caustic potash and the acid bath.

The stannate bath (usually sodium stannate) is now the most widely used type and is employed on both small scale and fully automatic plants in America and in Europe. It is the most useful of the "alkaline" baths and combines excellent throwing power with a smooth compact deposit throughout a range of conditions that are easily controlled and maintained in practice. The continuous replenishing of the bath with the tin ion from pure tin anodes presents no difficulty.

Steel tanks are preferable, wood and most plastics are liable to attack by the alkali present. Heating is best carried out by internal steel steam-heating coils. Electrical equipment is as for other plating processes.

Sodium Stannate Bath

The bath is essentially a solution of sodium stannate containing a little free caustic soda; the presence of sodium stannite is detrimental and must be avoided. The preferred concentration of the various dissolved salts depends on the operating temperature and/or the cathode current densities chosen. Satisfactory combinations of the major factors are shown in Fig. 1, but a normal range of composition is:

	Grams per liter	Ounces per gallon
Sodium stannate..	55 to 100	9 to 16
Free caustic soda .	10 to 15	1¼ to 2½
Sodium acetate (if desired)	15 to 30	2½ to 5
Hydrogen peroxide (100 vol.) or sodium perborate.	2/5	1/16

The solution is made by filling the plating bath about two-thirds of its depth with water at about 160 degrees Fahr., adding the sodium stannate and when it is completely dissolved adding the caustic soda. Before adding further ingredients, fill up the bath to its working level and check the bath concentration for tin and free caustic soda. When these have been adjusted add the sodium acetate and oxidizing agent and the bath is ready for use.

The sodium stannate is a reservoir of tin which is given up to the cathode and constantly replenished

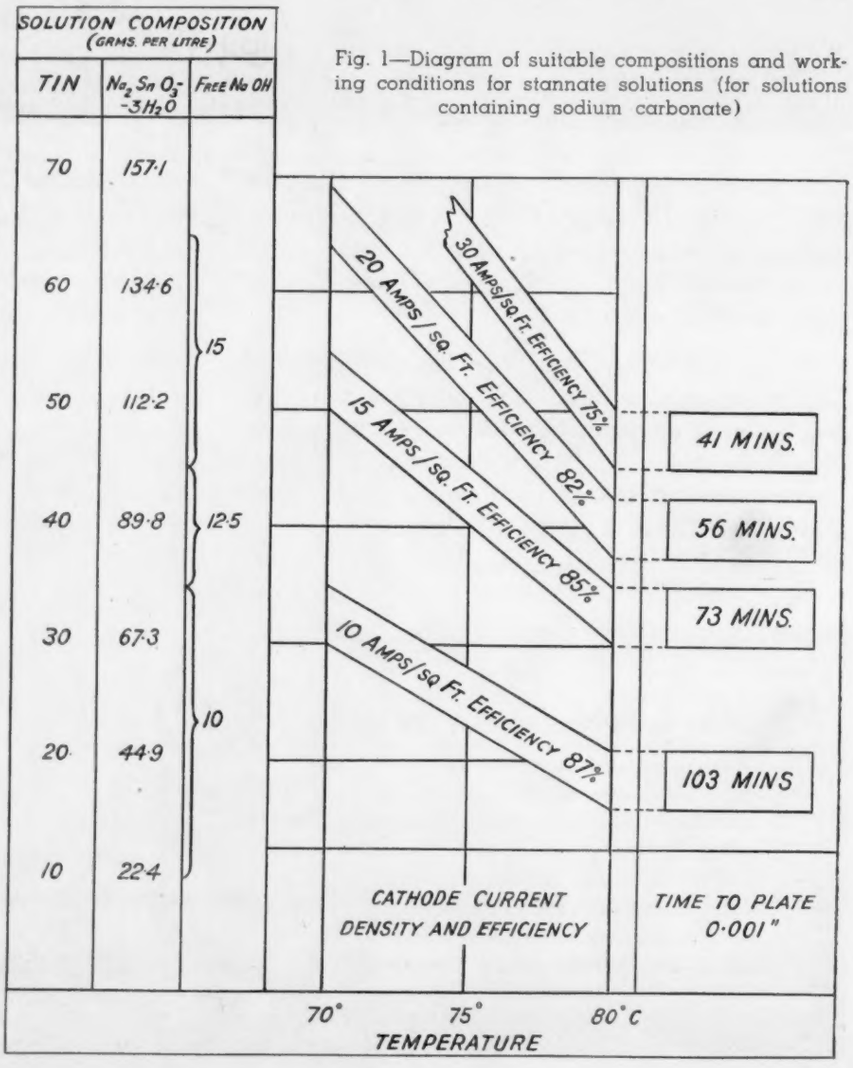

Fig. 1—Diagram of suitable compositions and working conditions for stannate solutions (for solutions containing sodium carbonate)

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from the anode. A weak solution necessitates a low-current density and hence slow plating. Caustic soda, in the amounts recommended, is required to maintain the tin in solution without the formation of tin hydroxides, and to ensure the proper dissolution of the anode. Sodium acetate is a "buffer salt" and is claimed to widen the range of conditions under which satisfactory deposits are obtained.

Hydrogen peroxide and sodium perborate are oxidizing agents and are added to new solutions to oxidize any traces of stannite or traces of undesirable impurities which may happen to be present in commercial sodium stannate. The hydrogen peroxide is decomposed completely within a few hours and is not an essential constituent of the bath. If, however, stannite ions should inadvertently form in the bath, they must be removed by an addition of hydrogen peroxide. This will oxidize the stannite but will not prevent the anodes producing further stannite if they have become defilmed.

Cathode current density ranging from 10 to 25 amperes per square foot are in use; 15 amperes per square foot is normal. Higher values must be accompanied by higher bath temperatures, and the caustic content should be adjusted. Little saving in the time for plating any given thickness is achieved by using current densities greater than 25 amperes per square foot, however, as the cathode efficiency falls off, and control becomes more difficult. The relationship between current density, bath concentrations and temperatures is shown in the chart.

Tin Should Dissolve

The operating current density, once the film is established, should be about twice that used at the cathodes, i. e. the anode area, calculating only the surfaces facing the cathodes, should be about half the cathode area. The anode efficiency under which such conditions varies between 75 and 95 per cent according to the current density employed. It is important that the conditions are such that the tin is dissolved in the quadrivalent, stannate form. When this is occurring, the anodes are filmed with a greenish-yellowish coating. The appearance is characteristic and is easily recognized. If the anodes remain a clean gray color, or are coated with a thin loosely adherent film of dark particles, the current density is too low and the anodes will dissolve rapidly as stannous tin, and rough spongy deposits will be produced. Should the current density rise too high, oxygen is given up at the anodes and little or no tin is dissolved, and the anode surface becomes at first brown and later is covered with a highly insoluble black oxide film which is difficult to remove except with strong mineral acids. The deposit will remain satisfactory for a time but will be of decreasing thickness, for the efficiency will decrease as the solution is depleted of tin.

To obtain the proper film on the anodes the following procedures are used:

1—Where the anodes are kept permanently in the solution: On commencing to plate, an excessive current density is applied for the first minute or so. This current is 1½ to 2 times that used for the fully loaded vat. The film will form rapidly and its completion will be noted by the experienced eye. As a check it will be noted that the voltage has risen suddenly about 2 volts and the ammeter has fallen correspondingly. Once the film is formed the current may be dropped to the normal operating density.

2—Where the anodes are lifted out of the solution when the bath is not in use: In this case the work is loaded into the vat first and then the anodes are slowly lowered into the solution with the normal current switched on. As the anodes enter the solution, the first portions receive a high-current density and immediately film over, and then, as the anodes are progressively immersed the films spread over their whole surfaces.

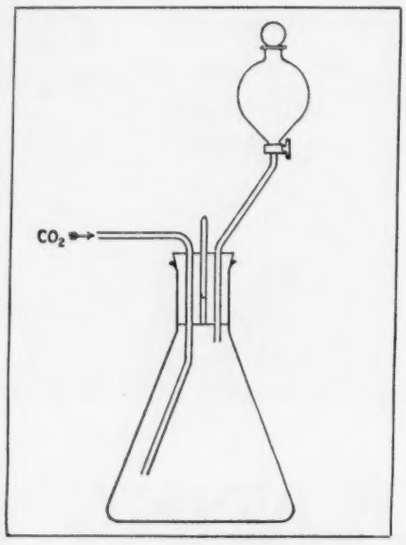


Fig. 2—Apparatus for tin determination

The behavior of the tin anodes is easily understood when it is realized that there is a critical range of anode current density below which the tin dissolves as stannite, and above which the anode becomes filmed. The critical density varies directly with the free caustic soda content and with the temperature. Its value also increases slightly with increasing stannate concentration but is decreased by the presence of sodium carbonate. Continued application of current densities higher than the critical will gradually cause complete passivity of the anodes, but if the current is lowered after the anodes have become filmed, continuous dissolution of tin as stannate is assured.

A 6-volt source of current is usually adequate for the bath as the voltage drop across the busbars is normally about 4 volts. The bath is commonly worked at 167 degrees Fahr. and suitable temperatures in relation to the other conditions are shown in Fig. 1.

If the free caustic content drops, the bath is liable to precipitate insoluble hydroxides of tin, and as carbon dioxide from the air is absorbed into the bath to form sodium carbonate, it is advisable to check the free caustic content at least twice weekly as it is best to keep its content within plus or minus 1 gram per liter of the quantity recommended.

Excess Should Be Removed

With operation prolonged over several months, excessive quantities of sodium carbonate will accumulate in the bath and should be removed. This can be done by allowing the bath to cool. If a tray of iron or nickel gauze is immersed in the bath before and during cooling, large crystals of $Na_2CO_3 10H_2O$ form on the tray and can easily be removed.

The most economic concentration for the bath depends on the current density and temperature employed and may be determined from Fig. 1. The enclosed areas represent the range of concentrations for satisfactory plating at each particular cathode current density. The solution concentration is given on the vertical scale and the temperature on the horizontal scale.

For example, if it is desired to work at 15 amperes per square foot the chart indicates a solution containing 40 to 45 grams per liter of tin and 12½ grams per liter of free caustic soda for working at 75 degrees Cent. If, however, the temperature is to be raised to 80 degrees Cent., the tin content should be 30 to 35 grams per liter and the free caustic 10 grams per liter.

The efficiencies at each current density are given within the enclosed areas, while the time needed to plate 0.001-inch coating is given alongside.

The figures refer to normal solutions under industrial conditions containing fairly considerable amounts of sodium carbonate (100 grams per liter). New solutions free from sodium carbonate would

give 90 per cent efficiency at each current density. If the plating solutions are weaker than those shown they may give greatly reduced efficiency, but on the other hand more concentrated solutions give only slightly greater efficiency.

By using the conditions recommended in the chart and the correct area of anodes, the bath should maintain its composition over long periods, and require no additions of salts apart from the caustic soda required to make up for losses due to the absorption of carbon dioxide. Maintenance of the correct amount of free caustic soda is important for balancing anode and cathode efficiency; for while alteration of other factors, such as temperature, affects both anode and cathode efficiency in a similar manner, decrease in free caustic soda will raise the cathode efficiency but lower the anode efficiency. In practice the optimum anode area is affected to a certain extent by the amount of tin lost through "drag-out." If the "drag-out" is high the anode area should be somewhat over half the cathode area, as recommended. For this reason periodic check analyses of the tin content should be made: the anode area being increased if the tin content falls and vice versa.

Occasionally practical platers add to the bath organic agents such as lactic acid (6 grams per liter), tin resinate (¼-gram per liter), or resin (¼-gram per liter), the purpose being to improve the color of the deposit. Such additions must be made with great caution, as they do not disperse readily throughout the bath and may give rise to a patchy appearance on the deposits. There is also a tendency to reduce the cathode efficiency when first added.

Sometimes solutions will not give deposits as white or as smooth as desired. Raising the temperature, or lowering the current density will often improve quality. If not, the trouble may be due to stannite ions and an addition of hydrogen peroxide or sodium perborate is called for.

Deposits of unsatisfactory appearance may also be produced if the bath contains certain metallic impurities, derived, for example, from the use of impure tin anodes or impure sodium stannate. Such impurities usually disappear on working the bath with pure tin anodes.

Since it is absolutely vital that the anodes be kept filmed, and as the film will dissolve off rapidly if the current is cut off, it is desirable to insure that the bath works as continuously as possible. It is sometimes convenient to employ "false cathodes"—for example, thin sheets of pure tin which may be used to provide a small load when there is no other work in the bath.

As a precaution against accidental defilming of the anodes, all electrical connections should be as reliable as possible, and anode connections should be by nuts and bolts or other rigid attachment. Connection by merely hanging on a hook is unsatisfactory, as, if even only one anode becomes defilmed, sufficient stannite will quickly be formed to contaminate the bath.

Analytical Methods of Control

Reagents required:

1. Standard hydrochloric acid 0.1 *N*;
2. Barium chloride solution, $BaCl_2$ (10 per cent);
3. Thymolphthalein indicator, 1 per cent in alcohol.

Free Caustic Soda: A 5-cubic-centimeter sample of the bath is transferred by a pipette to a conical flask, add 50 cubic centimeters of the barium chloride solution and one drop of the indicator. The suspension should then be titrated with the standard acid with vigorous shaking until the blue color is discharged. Add a further drop of indicator and continue titration. The end point is taken when the color changes from a definite blue to practically white; this occurs comparatively sharply over a few tenths of a cubic centimeter of titrating acid. The end point is a little slower when large amounts of sodium carbonate are present, but an accuracy within 1 gram per liter is easily obtained.

1 c.c. of 0.1 *N* HCl = 0.004-gram caustic soda; = 0.8-gram free caustic per liter (on a 5-c.c. sample).

It is sometimes recommended to filter out the precipitate before titration, but in the process, carbon dioxide from the air may neutralize some of the caustic and it is found that the retention of the precipitate does not affect the accuracy of the determination.

Tin Concentration (Stannate Content): The most suitable methods are based on the reduction of the tin to stannous chloride followed by titration with standard iodine. The standard methods of reduction with nickel sheet or powdered antimony as found in text-books may be used, but perhaps the most convenient method for routine analysis is the reduction with sodium hypophosphite.

Reagents required:

1. Sodium hypophosphite, 5 grams for each estimation (a suitable measure may be used instead of weighing).
2. Hydrochloric acid, 50 c.c. concentrated acid, plus 50 c.c. water.
3. Mercuric chloride, a saturated solution.
4. Citric acid, 50 grams to 100 c.c. water.
5. Potassium iodide, 4 per cent.
6. Starch indicator.
7. Standard iodine solution, 0.1 *N*.

The apparatus is a large conical flask fitted with a three-holed bung, see Fig. 2. The first hole carries a tube to pass in carbon dioxide, the second a tap funnel, and the third is used to insert the burette.

Dissolve a 5-cubic-centimeter sample of the bath in 20 cubic centimeters of hydrochloric acid in the flask and then pass a rapid stream of carbon dioxide, say for 5 minutes, to expel all air from the apparatus. After this, the carbon dioxide may be turned down to a slow stream, which should be kept passing during the subsequent reduction and titration in order to insure that no air enters the apparatus. Now add 5 grams sodium hypophosphite dissolved in 80 cubic centimeters of hydrochloric acid and then 1 cubic centimeter of mercuric chloride. Boil gently for 20 minutes. Meanwhile, take 10 cubic centimeters of potassium iodide, 50 cubic centimeters of citric acid and 1 cubic centimeter of starch, dilute to 250 cubic centimeters and boil to expel dissolved air, then cool somewhat. When the flask is removed from the flame add this solution and allow to cool. When cold, titrate with standard iodine, inserting the jet of the burette through the stopper. The end point is taken when the first permanent blue color is obtained.

1 c.c. of 0.1 *N* iodine = 0.00593 gram of tin; = 1.19 grams of tin per liter on a 5-c.c. sample.

Tin Concentration (Simplified Determination): To avoid the use of an external supply of carbon dioxide, the following modifications can be made to the foregoing procedure. The results agree within 1 gram per liter, the modified method being about 0.5 grams per liter too low.

The flask should be fitted with a rubber bung with one hole only carrying a glass tube drawn out to a jet at its outer end. After the flask has been boiled for 10 minutes and the potassium iodide, citric acid and starch solution added, drop in two pieces of marble, replace the stopper and cool quickly under a tap. When cold remove the glass tube and insert the burette, and titrate. To prevent appreciable oxidation, it is necessary to avoid violent agitation both during cooling and titrating.

Stannous Tin (Stannite Content): This determination is required only after many additions of free caustic have been made, and standard methods, based on the evolution of carbon dioxide, are applicable to this bath.

The composition of commercial sodium stannate corresponds approximately to the trihydrate—$Na_2SnO_3 3H_2O$, but its quality may vary considerably according to the method of production. Two grades frequently supplied contain 32 to

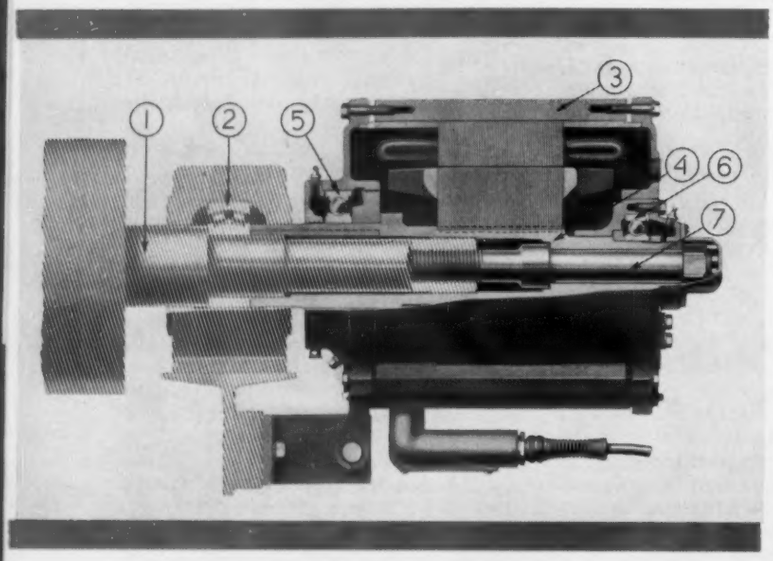
(*Please turn to Page* 86)

RELIANCE FLOATING-MOTOR *for* TABLE ROLLERS

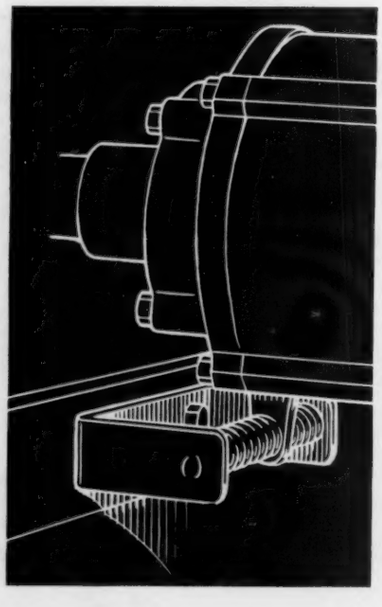
Reliance Floating-motor Drive for Table Rollers. A-c. squirrel-cage, enclosed, watertight, ball bearings, Class B insulation. For extra strength, stator frame is constructed of bar-steel, electrically welded. Motor is mounted with outlet and restraining arm at bottom.

ROLLERS can warp, tables become uneven, but this new Reliance Floating-motor Drive keeps material moving just the same. . . . Gears and couplings are not needed. . . . Roller and rotor become an integral unit on a common set of bearings. There can be no misalignment. . . . Air gaps stay uniform. . . . Mounting the motor on the roller shaft is as simple as applying a gear or coupling. There is no "lining up" . . . . Roller and driving motor can be removed from the table as a unit. . . . Table construction is simplified. . . . For both A-c. and D-c.

* * *



Motor is mounted on the roller shaft (1) in a manner that makes the rotor an integral part of the roller; there can be no relative movement between them. Rotor and roller are carried on the same set of bearings (2). The motor stator (3) is carried from the hollow shaft (4) through ball bearings (5, 6). This avoids any possibility of the rotor being displaced in reference to the stator so that air gaps are kept uniform. In mounting the motor the hollow motor shaft (4) is slipped over the shaft extension of the roller (1). The threaded portion of the jack screw (7) engages the tapped hole in the roller shaft and the motor is drawn into position by turning the jack screw.

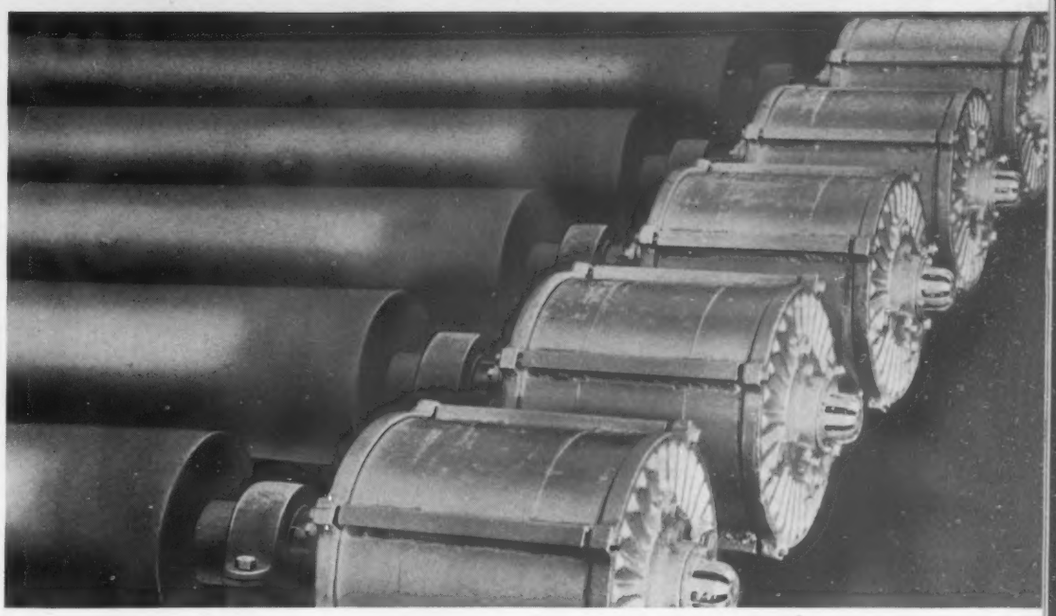


Two coil springs anchored to the table bed prevent rotation of the field frame and through their reaction, compel the rotation of the rotor or armature, and therefore, the roller. The springs not only prevent rotation of the field frame, but also cushion the starting of the motor.

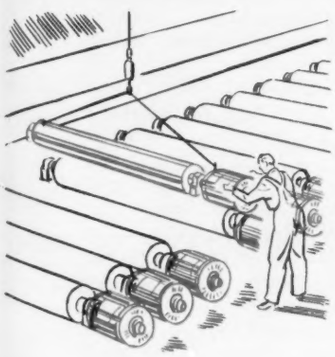
DRIVE

Patent No. 2,198,863

SPEED CONTROL. A-c. Speed variation for table rollers using squirrel-cage motors can be provided by frequency control. **D-c.** For d-c. motors variable-voltage control is used to supply variations in speed. The range in speeds is such that material of various sizes can be handled at the most effective rate.

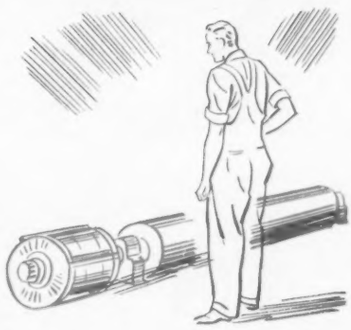


Runout Table Rollers equipped with Reliance Floating-motor Drive. These units operate successfully even when rollers are warped and mountings are not level. Table and installation costs are less, and so is maintenance. Built for both a-c. and d-c. circuits.



Roller and driving motor can be removed from the table as a unit after disconnecting the flexible leads.

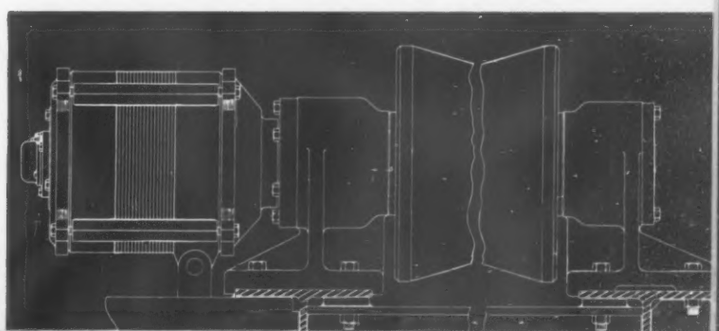
Table construction can be exceedingly simple and inexpensive as the table does not necessarily have to be level.



There can be no misalignment because roller and rotor become an integral unit on a common set of bearings. Troubles with gears and couplings are eliminated.

It is easier to remove the motor from the roller than to take off a pinion. Another aid to speed up maintenance.

FOR ROLLER CONVEYORS. Roller conveyors handling tubing and bars can be kept moving more steadily with the simplified Floating-motor Drive. The jobs of installation and maintenance are made easier. Misalignment is no longer a problem.



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Heating and

HEAT TREATMENT of ORDNANCE

Section IV—Gun Mounts and Gun Barrels

By E. W. WEAVER
Assistant Chief Engineer
Surface Combustion Corp.
Toledo, O.

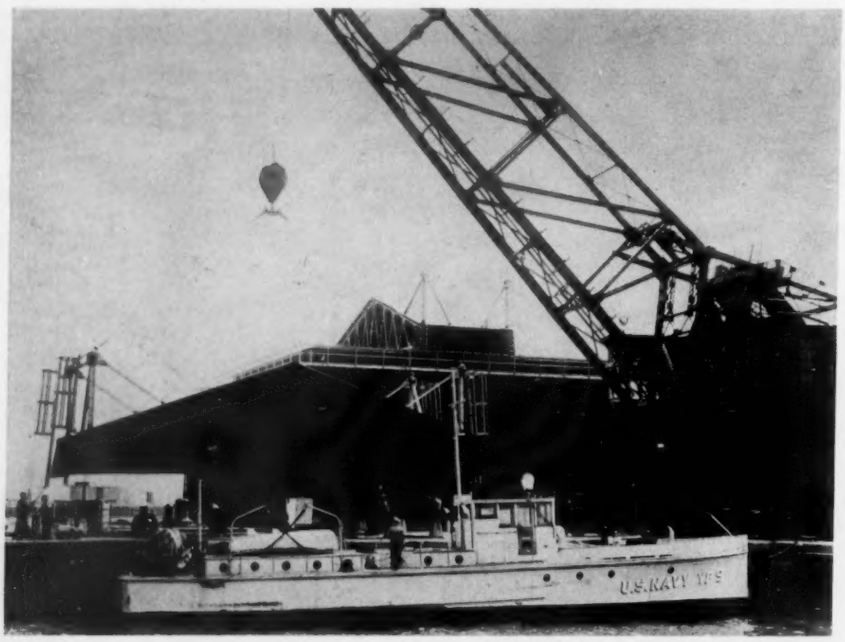
■ PRESENT-DAY gun mounts, carriages, bases, etc., are built up largely of shapes, plates, and structural members completely welded wherever possible. See STEEL, July 28, 1941, p. 52. Welding together of steel parts is a high-temperature process that involves the melting of metal at a localized point followed by immediate cooling in air or otherwise. Obviously such a treatment may produce strains within the metal and so reduce its physical properties since these strains will be added to those strains imposed in service. In frequent cases, the result is to render the part incapable of sustaining the required load. Too, these strains may even be severe enough to cause distortion and interfere with the final assembly.

To relieve the strains set up in the metal by welding, the mounts and other similar parts are given a stress-relief anneal at various stages of fabrication. This anneal is usually a comparatively low-temperature operation varying from 750 to 1250 degrees Fahr., depending on the structure.

Because of the low temperature involved it has been found that furnaces of the recirculating or forced-convection type are especially well adapted for this purpose. In the first place, they lend themselves to extremely accurate temperature control. This is important not only for processing parts where accurate temperature control is required for metallurgical reasons, but also in those cases where it has been found that a particular rate of heating is desirable, as in certain welded structures.

Experience has shown in these cases, especially where the structure is a complicated one, that a rate of heating faster than a certain minimum will cause the structure to crack in the most unexpected places. The recirculating or forced-convection type furnace is well adapted to work of this kind since the rate of heating can be controlled quite closely and local overheating of any part of the work is avoided. Furthermore, a uniformity of temperature may be obtained in large furnaces so that the largest size structures may be heat treated with exceptional accuracy in this way.

Furnaces of this type have been



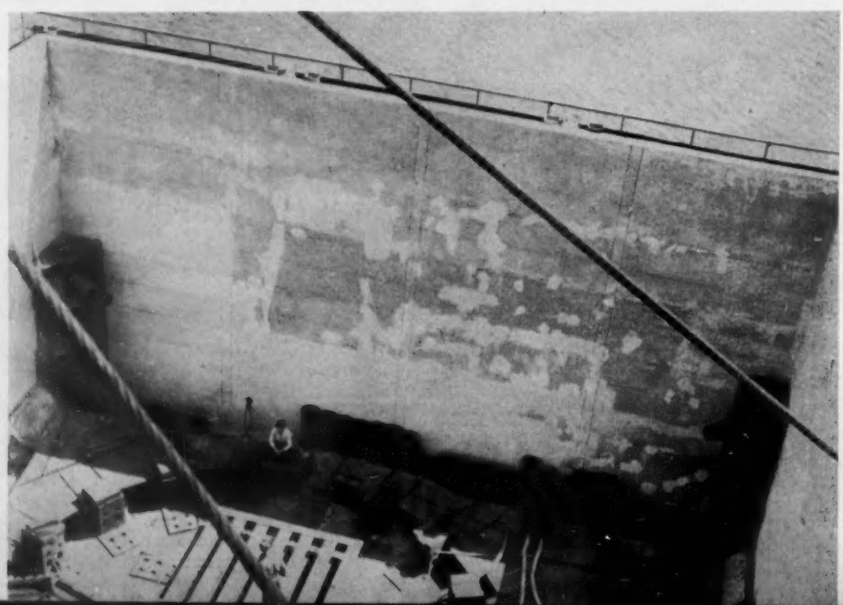


Fig. 1. (Upper view)—Forced-convection furnace at Brooklyn Navy Yard is so large that access for loading and unloading is had only by lifting off the entire roof using a huge crane as shown. Note size of roof section compared with ship. Furnace easily accommodates large welded section of ship armaments, superstructure, hull reinforcements and gun tubes. A similar furnace is installed at Philadelphia Navy Yard

Fig. 2. (Lower view)—Looking into the furnace shown in Fig. 1 after roof has been lifted off. Furnace has working chamber 56 feet long, 48 feet wide, 30 feet high. Rated gross charge is 672,000 pounds

built in extremely large sizes. For instance, one at the Brooklyn Navy Yard has a working chamber that measures 56 feet long, 48 feet wide, 30 feet high. The furnace is charged by removing the roof with a huge crane. External dimensions of the outside protective casing are 80 feet long, 61 feet wide, 44 feet high. The furnace is rated at a gross charge of 672,000 pounds and has a maximum gas input of 16,000,000 B. t. u.'s per hour. Thirty-six hours are required to heat the rated charge to 1250 degrees Fahr. Gun turrets and other parts for the world's largest battleships such as the MISSOURI and IOWA are being treated in these furnaces. Fig. 1 shows an exterior view of this furnace. Fig. 2 is a view looking down into the furnace. Note the hot air inlets in the corners and the pipes used to conduct the air to any portion of the furnace desired.

Since weldments such as gun mounts and tank sections are often bulky and of varied shapes, car-bottom furnaces are well adapted for stress relieving these parts. A convection heated car-bottom furnace is shown in Fig. 3. The following data concerning one particular car-bottom convection furnace for this purpose is typical of furnaces of this type: Effective loading space of 17 feet long, 10 feet wide and 6 feet high. The outside dimensions of this furnace are 28 feet by 13 feet by 13 feet. The rated capacity is 5000 pounds per hour, heated from cold to 1100 degrees Fahr., though the furnace can easily be adapted for 1250 to 1300 degrees Fahr. maximum. A charge of 10,000 pounds can be brought to temperature in two hours if the specifications permit this rapid rate of heating.

Two supply ducts with adjustable louvers are hung under the roof. Two return ducts are built on the car under the cross beams supporting the work. These ducts telescope into openings in the rear wall of the furnace.

The recirculating fan at back of the furnaces takes its suction from the ducts of the car and forces the hot gases through an overhead gas-fired heater into the supply ducts under the furnace roof. The louvers, which can be adjusted from outside the furnace, permit a uniform distribution of heat down through the work. The temperature distribution can easily be held to within plus or minus 5 degrees Fahr.

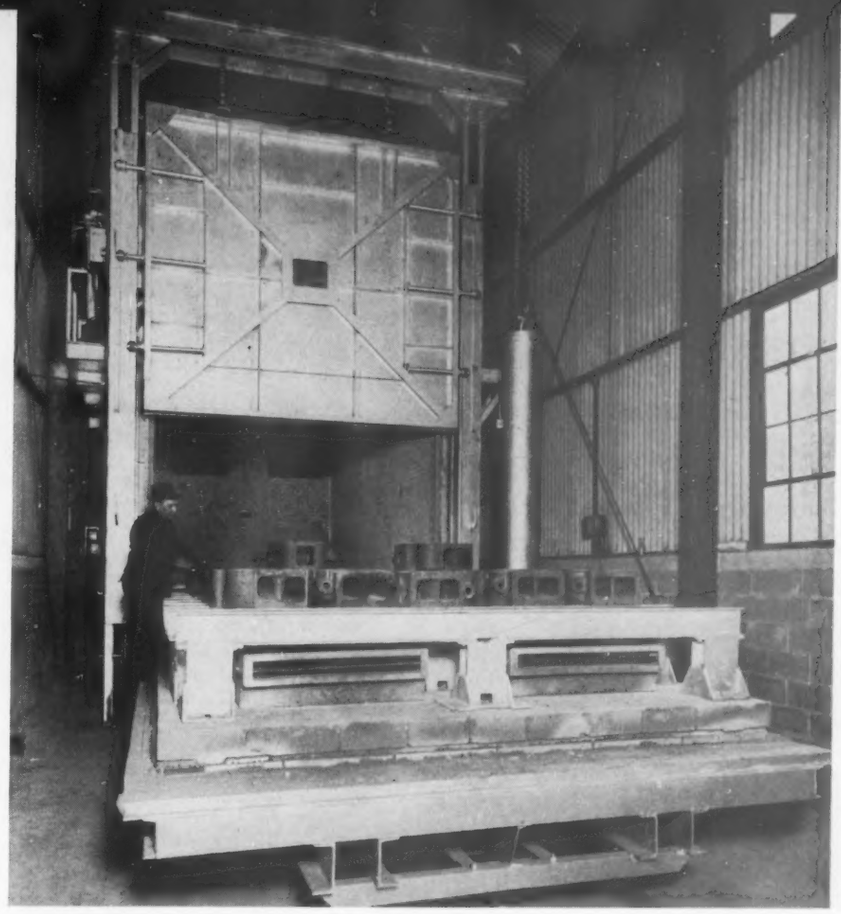


Fig. 3. (View above)—Forced-convection car-bottom furnaces such as this are used extensively for stress relieving welded gun mounts, tank structures, carriages and the like

Gun Barrel Furnaces: For hardening gun barrels, the vertical pit-type furnace is quite common as it guards against bending during the heating operation. One typical installation of a direct-fired pit-type furnace is 25 feet deep by 9 feet inside diameter. The gun barrels, singly or in groups of two, three or four, are hung from a special fitting or spider. This may be handled with the furnace cover or separately, as desired.

The furnace is direct fired with low-pressure burners which are applied to insure the most uniform heat input and distribution. The burners are controlled in vertical zones.

After hardening, the barrels must, of course, be drawn. Here, also, the pit-type furnace is often used, although the use of a car-bottom type furnace is quite common for this purpose as the temperature is usually such that the barrels may be supported horizontally without bending. In the pit-type draw furnace, both direct-fired and forced-convection units are in use. However, at the usual draw temperatures, the convection-type furnace is more efficient and will have a considerably better temperature uniformity. The same applies to the car-bottom type of furnace for drawing. Fig. 4 shows an installation of direct-fired pit-type hardening and draw furnaces.

After drawing and finish machining, the gun barrels are usually given a low-temperature stress-relief anneal. Furnaces for this purpose are similar to those used for drawing with the forced convection type predominating in the latest installations.

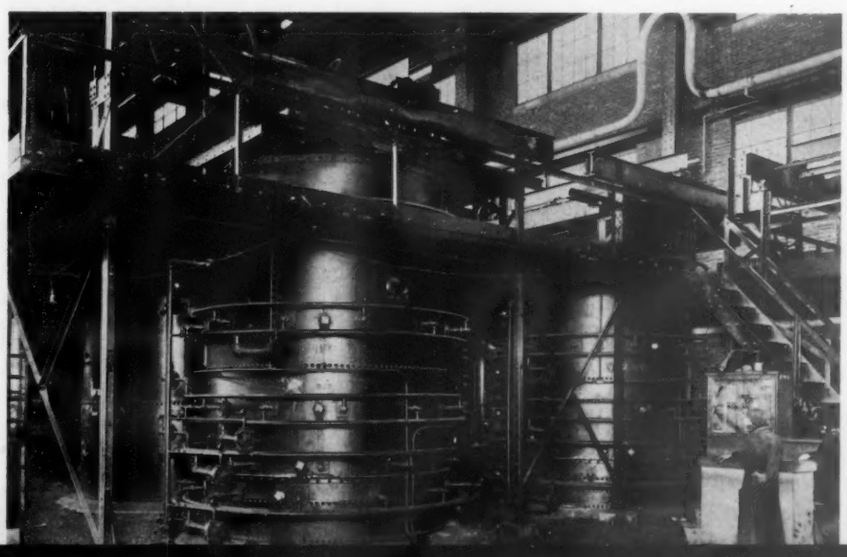


Fig. 4. (View below)—These steel-cased direct-fired pit furnaces are used for hardening and drawing gun barrels. Furnaces of this type sometimes provide total working depths in excess of 100 feet. Note here the furnace tops roll back on rails to provide access to interiors

ADVERTISING PAGES REMOVED

NEW BUS-BAR SUPPORT SYSTEM

■ WHEN modernizing a hot strip mill recently, it became necessary to build an 11,500-ampere 600-volt direct-current bus, capable of withstanding short circuit currents of about 300,000 amperes, with a 24-inch centerline spacing between polarities. Ordinarily the positive and negative buses for such a mill are built with a centerline spacing of 8 to 12 feet or more. Similarly, circuits are usually taken off the buses through separately mounted circuit breakers, arranged in two rows on either side of the basement, and adjacent to the machines to be fed.

In this case, however, the entire circuit breaker and bus structure had to be mounted on a narrow gallery above the motor room floor level. All breaker panels had to be in a single continuous line with both buses placed on the tie-rod structure above them. The assembly had to be low enough to avoid interference with a crane overhead, and high enough to allow installation over the top of the old panels and bus which were being replaced. The idea was to install the complete new bus over the old equipment and then carry out a piecemeal replacement of old breaker panels with new ones thus minimizing service interruptions.

By W. N. GITTINGS
Switchgear Division
General Electric Co.
Philadelphia

Since short-circuit stresses set up in the bus-supporting members vary inversely as the bus spacing, stresses here are from four to six times as great as those usually encountered. Furthermore, because space was at a premium, conventional cantilever-type supports strong enough to withstand such stresses were out of the question.

Utilizes Heavy Steel Rod

The design developed to overcome these difficulties is based upon using separate members for withstanding short-circuit stresses and for supporting the weight of the bus. The member used to withstand the short-circuit stresses uses a heavy steel rod between buses, insulated from them by means of heavy duty "doughnut" porcelains and herkolite insulation wound on the rod. Fig. 1 shows the components of this strain insulator and tie-rod assembly. Repulsion forces resulting from short circuits are resisted by the steel rod in tension and the porcelain "doughnuts" in compression, the most efficient use of these materials mechanically.

Such a design can be completely factory-assembled to form 20-foot sections of bus, eliminating all field work on this vital portion of the installation.

Only a few porcelain insulators are necessary to support the weight of the bus. Standard channel bus support fittings allow free longitudinal motion of the bus under expansion and contraction. See upper left, Fig. 2. In this case only four such insulators were needed per 20-foot section of bus. These insulators, of course, do not resist any portion of the short-circuit forces, these being handled by the assemblies shown in Fig. 1.

For connections from the cables entering the switchboard from the generators and motors to the circuit breakers, an adaptation of the strain insulator assembly is used. As shown in lower center, Fig. 2, this also supports the weight of the connections and the instrument shunts.

As this type of construction embodies economy of space, factory-assembly in large units and elimination of short-circuits stresses from supporting structures, it should prove valuable in the ever-increasing number of instances where buses must be constructed in a limited space to withstand high short-circuit currents.

Semi-Automatic
MATERIALS HANDLING

. . . . . in feeding presses triples output in some applications yet allows use of present dies, and furnishes 100 per cent protection to the operator

By M. D. HEYMAN
President
Heyman Co.
New York

Fig. 1—The semi-automatic feed is shown here attached to an ordinary press using same dies as would be employed if fed by hand. A foot pedal starts motor driving the feed, which in turn trips press automatically when a part is inserted between dies

■ THE PATENT office is full of ingenious mechanisms for protecting both press and worker. Too, there are manufacturers who specialize in, and some cases manufacture nothing else but safety guards for power presses. Also shop foremen are always particularly vigilant in the press department to see that workers do not take unnecessary chances and that presses are properly protected. Yet despite these precautions and special safety devices, over half a million dollars is paid out annually in compensation for accidents occurring at power presses. And this is only part of the terrific toll that this machine exacts. The power press is the most dangerous machine in the metal-working industry.

Psychology Important: The reason why it appears impossible to develop a satisfactory guard that will completely protect the operator lies in the worker's psychology. The hand feeding the press continuously develops a more or less mechanical series of movements timed to synchronize with the machine. When the operator discovers two blanks stuck together in the die, he may already have tripped the press but his hand automatically grabs for the blanks since the human tendency to correct an error is very strong. In fact, the mechanical reaction is usually so fast and the mental safety warning so slow that an accident often occurs.

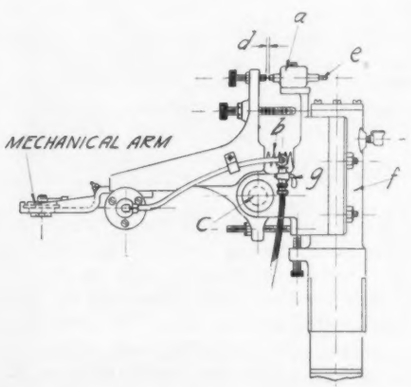


Fig. 3—Schematic of pickup arm showing hinge pin at C and microswitch in safety device at **a.** If a blank is already in die, arm will pivot and actuate safety switch as arm lowers to deposit second blank on dies. Any object 0.005-inch thick or more will actuate the safety trip

Blanking and piercing operations are not as dangerous as the forming or secondary operation. At the same time, forming is the slowest of all press operations because the operator must put his hand between the punch and die.

Then there is the matter of production. There never was a guard invented that could not be circumvented. Operators compensated on a piecework basis are especially apt to discard guards for they usually hamper the work. The obvious answer is to use automatic dial or slide feeds, but the problem is not solved so easily as that.

When a shop changes over to ordinary semi-automatic or dial feeds, it becomes necessary to change tooling setups completely and to scrap all of the old dies because in the usual dial feeds, the dial passes over the die so the die must be specially made to work with the dial itself.

Of course there is the other possibility—using progressive dies and feeding the material continuously into the press in the form of strip, the whole operation being done automatically, including the feeding. However, this is only practicable where sufficiently large quantities of work are involved to warrant the cost of the progressive dies. Too, due to constant rapid changes in design, many press shops consider it best to manufacture parts in moderate quantities. Therefore most press work in stamping shops runs between 3000 to 500,000 pieces—a maximum quantity for which it hardly pays to make progressive dies because of their high cost.

No Special Dies: The above factors emphasize the importance of a recent materials handling development, the Heyman semi-automatic feed, for placing the work in the press dies. The system is applicable to blanking, piercing and forming operations of a wide variety. Since it does not require special dies, it can be used with the dies at hand. Already, it has been applied to presses up to 50 tons in size and is being developed for larger units at the present time.

Any type of metal can be handled and there is no limit as to how thin the parts may be. As for dies, any height or type within reason can

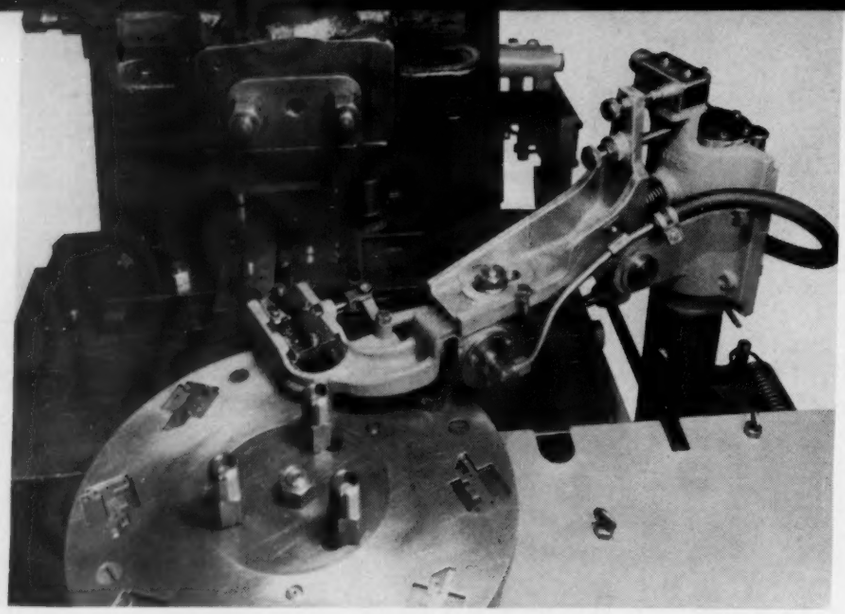


Fig. 2—Operator places parts in cavities on dial which rotates under pickup arm that in turn inserts work between dies

be accommodated.

Production rates are greatly increased by the use of the Heyman semi-automatic feed as the operator at no time needs to work under the die. The method is particularly applicable to feeding pieces previously placed in the press with pliers or tweezers. In manufacturing switch and contactor parts, telephone equipment and many other small parts, the pieces of work are so small that it is necessary to feed them into the press with pliers or tweezers to prevent serious accidents. For instance, General Electric Co. has a showcase full of such pliers that have the ends nipped off by the press. A production of 6000 pieces per day using pliers is regarded as very good. Using the semi-automatic feed described here, this can be more than doubled. One plant that was producing 5000 pieces daily now has an output of 15,000—300 per cent of former rate.

Of course the increase in production depends upon the type of work being done. The more difficult the job, the better the relative performance of the semi-automatic feed. However, it is quite common to feed 43 pieces per minute with this system so a normal output between 2000 and 2500 pieces per hour is common. Production is quite consistent since the machine sets the pace for the operator.

How It Works: The system is entirely different from that used in an ordinary dial feed since the dial does not travel under the dies nor is it operated from the press. On the other hand, as will be seen in the illustrations, especially Fig. 1 and 2, the dial is out in front of the press at all times. An arm picks up the work from the dial and places it accurately in position in the dies. The operator merely places the pieces of work on the indexing table. Then as the blank reaches a point directly opposite the die, the pickup arm removes the blank from the dial, places it in the die and moves back to pick up another piece. As the pickup arm travels away from the dies, a cam in the feeding mechanism trips the press, causing the press ram to descend. Work is usually removed from the press by a synchronized air blast.

The feed mechanism is operated continuously or intermittently by the operator through a foot switch which controls an individual electric motor that drives the feed. It is evident that the feed mechanism controls the press, instead of the press controlling the feed as is the case with ordinary dial feeds.

Careful design of the cams and feed mechanism enables the device to lay a blank down on the die within a few thousandths of an inch of a given position. The feeding is so exact that no special stops or guides are required.

Operation Sequence: In using this feed mechanism, the operator steps on the foot switch, causing the dial to rotate. As the dial revolves the operator places parts in the recesses in the indexing table.

As the work is indexed under the pickup arm, the piece is either gripped at its sides by mechanical jaws or from its top by a vacuum attachment. A cam in the mechanism then causes the arm to lift the blank from the indexing table, carry it under the dies, release it and then allows the pickup arm to swing back to the indexing table. As the arm swings back, the press is tripped and ram descends. The particular model shown in Fig. 2 employs a 7-inch movement of the work from the indexing table to the dies.

Work is usually ejected automatically from the press by means of a blast of air synchronized by means of an air valve connected to the press.

The feeling of safety, the fact that the operator can work where the light is good and away from under the die enables a fast, rhythmic synchronism to be attained easily. Production increases up to 60 per cent are common in the ordinary run of press work. As mentioned previously, this increase in production depends directly upon the difficulty of the job, exceptionally difficult jobs showing increased rates up to 300 per cent.

The system employs a number of features exceptionally effective in increasing production and affording maximum safety.

For instance, two types of pickup arms are furnished—the mechanical pickup and the vacuum arm. In the mechanical pickup, the two jaws or fingers of the pickup are drawn together by means of a toggle in turn operated through a vacuum cylinder. This arm makes it possible to handle an enormous variety of dangerous and slow operations. Its application is limited only by the ingenuity of the tool or diemaker in adapting it to the job at hand.

Because it has no moving parts, the vacuum arm is preferable wherever a flat lifting surface presents itself. The nozzle is shaped to suit the work to be lifted and usually is made from bronze.

Automatic Safety: In no case is it necessary for the operator to see what is happening in the die. There is no danger whatever of two blanks being deposited as a safety device is incorporated in the pickup arm which prevents this occurrence. This is a particularly important feature because two or more blanks deposited in a die will usually result in damage to the die or the press.

To prevent this, the pickup arm is hinged near the post at C, Fig. 3, and held in a set position by spring B and adjustable stops. In operation, the complete arm shown in Fig. 3 travels upward vertically from the indexing plate, moves horizontally under the dies, and then travels vertically downward to deposit the work on the die.

But note in Fig. 3 the limit switch at A. Any obstruction on the die more than 0.005-inch thick or high will cause the pickup arm to pivot about C, actuating the microswitch A. This switch is part of a normally closed circuit through which current flows to the solenoid mounted at the side of the press. This solenoid in turn actuates the trip or clutch on the press. Thus the presence of any obstruction 0.005-inch or higher, such as might be represented by a blank which had not been removed, opens the limit switch A, cuts current from the solenoid, and thus disengages the trip of the press, rendering it inactive. When the press is clear again, a slight touch on the reset button E of the limit switch will reset the system.

Speed of the pickup arm when it is returning empty from the dies is

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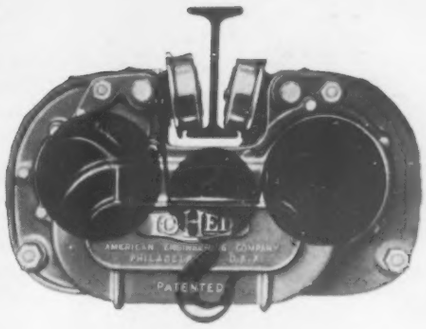

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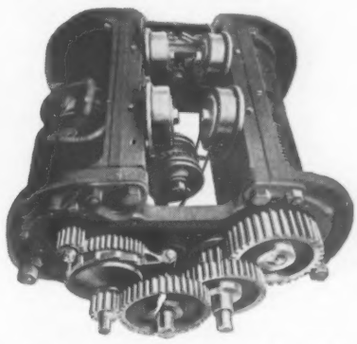

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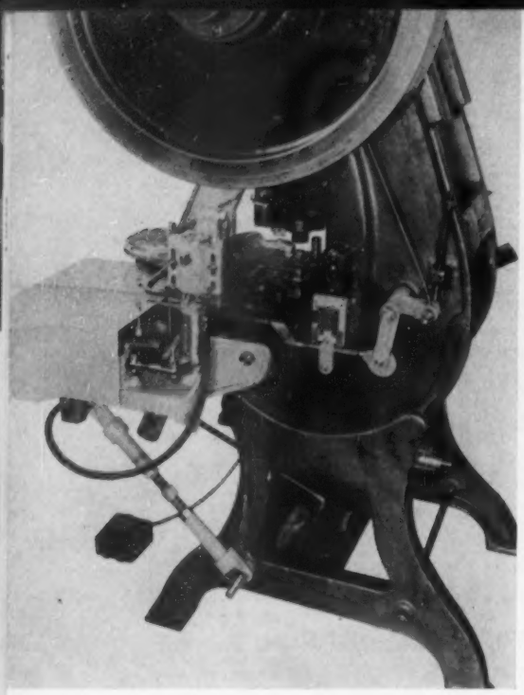


Fig. 4—Closeup showing method of attaching feed device to press and showing solenoid connected to the press trip—part of the automatic safety features incorporated in the drive to prevent damage to dies or press from insertion of two blanks

twice as fast as when it is carrying work to the dies. This quick return feature cuts "idle time" portion of the operating sequence.

Indexes Slowly: The indexing table is driven by a ratchet which works off a camshaft in turn rotated at a predetermined speed by a separate electric motor incorporated in the feeding mechanism. This feature is important since it allows the index table to move much more slowly with the result that no positive stops are needed. To keep the table from overrunning its position, a band brake is all that is necessary. On a press operating at 125 strokes per minute, the ordinary dial feed operated from the press indexes forward one station in about 1/6-second. With the Heyman feed, a full second is allowed for the indexing operation at this same press rate. Thus with the same rate of feed, the Heyman feed cycle can be six times as long, thus effectively eliminating difficulties caused by inertia of the mechanisms.

This feeding system is a complete separate unit which can be attached to any press easily.

As shown in Fig. 4, the entire mechanism is bolted to the lower frame of the press by arms at the side and is further supported by two diagonal brace rods. The guard in front of the press is connected with a safety switch so the mechanism cannot be operated when the guard is removed. Under normal conditions, the entire feeding machine can be attached to a power press in less than 10 man-hours of work.

A small vacuum pump is operated by a separate 1/6-horsepower motor to furnish a vacuum equivalent to 22 inches of mercury. This is sufficient to lift quite heavy pieces and carry them to the die without shifting.

Semi-automatic feed described here is made by the Heyman Co., 157 Chambers street, New York.

Mold Lubricant for Sintered Bearings

■ By use of a new lubricant developed by Glyco Products Co. Inc., 230 King street, Brooklyn, N. Y., sintered bearings of metallic powders now can be released from their molds very readily. Known as Acrawax C, the lubricant, a synthetic wax, is made entirely from domestic raw materials.

The method of procedure for use as a mold lubricant is to blend 15 per cent of Acrawax C and 85 per cent of stearic acid by melting together. Then 2 to 4 per cent of this wax mixture, based on the weight of the metallic powder, is added to the metallic powder and the whole heated above the melting point of the wax mixture and tumbled in the usual way. The metallic powder after pressure forming will release very readily from the mold. Hard and brown colored, the wax has a melting point of 134 degrees Cent.

Offers To License Aircraft Development

■ Bell Aircraft Corp., 2050 Elmwood avenue, Buffalo, recently announced its intention of licensing for use by other manufacturers a method of attaching fabric to control surfaces of airplanes.

This action was taken after successful use of the method for more than a year in the mass production of a high performance airplane of the Airacobra class, together with an intensive test program under the supervision of the United States Army Air Corps. Investigations also have indicated the method may have broad applications in other types of industrial manufacture.

The Bell fabric attachment employs the use of a special tool which forces thin retainer strips into extrusions in the rib construction, thus holding the fabric covering tightly in place. Only a small amount of pressure is required, and the fabric is held tightly without danger of tearing.

Time studies of this development show a saving of approximately 75 per cent over the conventional stitching procedure. Direct benefits include savings in production costs, increased speed of production, and a resulting attachment which is stronger than the conventional attachment. No holes are made and patches are not needed over the retainer. Also unskilled labor may be employed safely for the work.

Employe, below, applying method of attaching fabric to control surfaces of airplanes developed by Bell Aircraft, and tested satisfactorily by the Army Air Corps

Covering Simplifies Cleaning Painted Walls

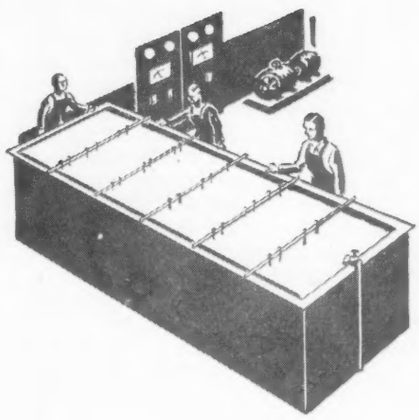
■ A washable protective covering for flat wall paint developed by Bergonize Co., Merchandise Mart, Chicago, for use in plants, warehouses and offices is reported to facilitate the cleaning of painted walls. It may be applied over a newly painted or cleaned wall and provides a clear, transparent, flat protective film that prevents dust, dirt and grime from penetrating the pores of the paint. Odorless, it dries within 20 minutes at 70 degrees Fahr. and possesses high degree of light reflection.

Covering is removed from protected surface merely by application of clear water with a sponge or rag, taking with it all dirt and leaving the surface in its original paint-clean condition. It is not recommended for use in rooms where an extensive amount of steam is vented into the air or where condensation takes place on the walls or ceiling.

United Chromium's Role

IN ASSISTING

THE PLATING INDUSTRY



WITH today's plating problems varying tremendously from one plant to another, United Chromium's role in assisting the industry has become a many-fold task.

Of primary consideration, of course, is the work of helping defense manufacturers utilize chromium plating and other U.C. finishes to best advantage, both on production equipment and finished products. Some manufacturers, for example, with no previous experience in chromium plating have to get into large-scale production immediately. Others are faced with the problems of plating new or unfamiliar parts peculiar to defense needs.

At the same time, attention is being given to the problems of other essential industries—equally important, although not engaged in the defense program. Many such plants face the problem of converting a part of their facilities to priority work. Others must incorporate changes in products, methods or cycle of operation to insure efficient plating with the materials available.

In serving hundreds of licensees, many of whose facilities are devoted to priority work, United Chromium is helping platers and manufacturers alike with the problems of:—

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MEETING SPECIFICATIONS — through use of the most efficient, up-to-the-minute methods — under the advisory counsel of U.C. Engineers.

CONSERVING MATERIALS — by utilizing U.C. processes and production materials to avoid waste of the essential metals.

We will be glad to assist in determining how the U.C. processes and products outlined below can be of service to you. Explain your problem briefly and address your inquiry to Dept. S United Chromium, Inc., 51 East 42nd Street, New York, N. Y. for a prompt response.

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Foremanship in View of Defense Problems

■ *Better Foremanship,* by Glenn Gardiner; second edition; cloth, 336 pages, 5 x 7¼ inches; published by McGraw-Hill Book Co., New York, for $2.50.

This is a book of practical questions and answers, presenting effective management methods for today's foremen. The subjects covered were chosen to give the foreman help with fundamental functions and practices of foremanship and also with the many new questions and problems that come as a result of recent changes in working conditions, labor relations and industrial methods.

In the second edition revisions and additions have been made particularly to cover the new responsibilities and new perplexities that face foremen as key men in the task of expanding industrial productivity under defense needs.

The first section is devoted to new features in relationship of foremen and workers; the second to new ways of handling old foremanship functions; the third to what every foreman should know about today's economic situation. In the appendix is presented a plan for foremanship development and formation of clubs.

# Indicates High-Speed Steel Best Opportunity of Conserving Tungsten

■ NUMEROUS opportunities exist for conservation of tungsten through increased use of molybdenum, according to the report submitted by the advisory committee on metals and minerals, National Research Council, National Academy of Sciences. This report, requested by OPM, embodies suggestions and criticisms received from users and manufacturers who inspected earlier drafts of the study, and has recently been released by E. J. Hergenroether, chief, Substitutions Unit, Bureau of Industrial Conservation, OPM. Zay Jeffries was chairman of the group which submitted the report.

Chief opportunity for tungsten conservation is in manufacture of high-speed steel, which takes 70 to 85 per cent of the country's total consumption of the metal, the report points out. Tungsten substitutes for this purpose have been developed the past 15 years and are acceptable in most applications, although some of these materials create new problems in the availability of additional equipment required.

Table below gives compositions of tungsten high-speed steel (T-1) and three types of molybdenum high-speed steel available for possible substitutions. Except for type M-1, ranges of composition are not given, because modifications of these compositions are frequently employed.

The M-1 type can be handled in the shop like T-1 tungsten steel. It is reported that it can be heat-treated in the same equipment and with the same technique as T-1. Apart from heat-treatment schedules the chief difficulty in the substitution of molybdenum lies in greater decarburization, with resultant increased costs, and complications and loss of time in processing schedules. The M-1 type is much less susceptible to decarburization than either M-2 or M-3, showing little or no difference from T-1 in this respect. The M-2 and M-3 types are both susceptible to decarburization. There is little difference in this respect between these two types.

Allegheny Ludlum Steel Corp. has a patent on a steel of type M-1 and has offered it, without charge, to all manufacturers. Cleveland Twist Drill Co. has a patent on Type M-2, and many major tool steel manufacturers are licensed. Vanadium Alloys Steel Co. and Crucible Steel Co. have patents on steel of the M-3 type and have offered them, without charge, to all manufacturers. All three types are in wide use; the exact proportions are difficult to determine and are changing at the present time.

All have good cutting properties and, apart from differences and difficulties in processing, are suitable substitutes for 18-4-1. Complete substitution of 18-4-1 by the compositions given would save one-half to three-quarters of the tungsten consumed in 18-4-1. Since some of the substitute compositions listed require more vanadium than T-1, a new difficulty may be created with respect to the availability of vanadium.

The report also lists several other substitute combinations composed of varying percentages of the elements included in the M types in the table. While some manufacturers and users are said to question the desirability of certain of these substitutes, the report states that the molybdenum high-speed steels, with or without tungsten, can be substituted for tungsten high-speed steels rather sweepingly. It is emphasized that if such substitutions are made to a sufficient extent little attention would have to be given to substitution for the other steels which include a smaller percentage of tungsten, such as the low-alloy tool steels. Greater use of cemented carbide tool materials and of tipped tools also is recommended.

Various molybdenum substitutes are suggested for low-alloy steels containing tungsten. The report points out that other substitutes containing neither tungsten nor molybdenum also are available and will be dealt with in other reports, but in this case the committee was concerned only with molybdenum substitution.

For a low-alloy steel of the following composition: 0.85-1.0 C, 0.30 Si, 1.3 Mn, 0.45 Cr, 0.45 W, 0.10-0.25 V, a molybdenum substitute of the following composition is suggested: 0.95 C, 0.30 Si, 1.3 Mn, 0.50 Cr, 0.25 Mo, 0.20 V.

A number of different analyses are offered to replace a steel containing 0.45 C, 0.3 Mn, 0.30 Si, about 2.0 W, 1.5 Cr, 0.25 V. These include the following:

C	Mn	Si	Mo	V	Cr
0.6	0.9	1.9	1.3	0.3	0.2
0.5	0.7	1.6	0.6	0.2	...
0.6	1.0	2.0	0.5	0.3	..
0.5	1.0	2.0	1.35	0.5	..
0.5	0.4	1.0	0.5	...	..
0.45	0.3	0.3	1.0	0.25	1.5
0.6	0.8	1.9	0.3	...	...

To replace a type containing 1.30 C, 3.6 W, 0.25 Cr the substitute could be 1.25 C, 2.0 Mo, 0.25 Cr, or else 1.1 C, 0.3 Si, 1.3 Mo, 1.2 Cr, 0.4 W, 0.3 V. Substitution for 1.25 C, 0.3 Mn, 0.75 Cr, 0.2 V, 1.4 is given as 1.3 C, 0.3 Mn, 0.75 Cr, 0.2 V, 0.75 Mo.

About 2 per cent of the yearly tungsten consumption is in manufacture of stellite, but substitution of molybdenum for tungsten has been attempted with but little success and is not recommended.

Substitutes are suggested for die steels containing tungsten, used mainly in the hot-working of metals, although the report states that the amount of tungsten consumed in these steels is minor.

Many exhaust valve insert seats

(*Please turn to Page* 86)

	T-1	M-1	M-2	M-3
Tungsten	18	5.0-6.0	1.5	...
Molybdenum	..	3.5-5.5	9.0	7.0-9.0
Chromium	4	3.5-4.5	4.0	4.0
Vanadium	1	1.25-1.75	1.0	2
Carbon	0.70	0.60-0.90	0.80	0.80

SAVE TIME
WITH SOUTH BEND LATHES

SPEED

★

ACCURACY

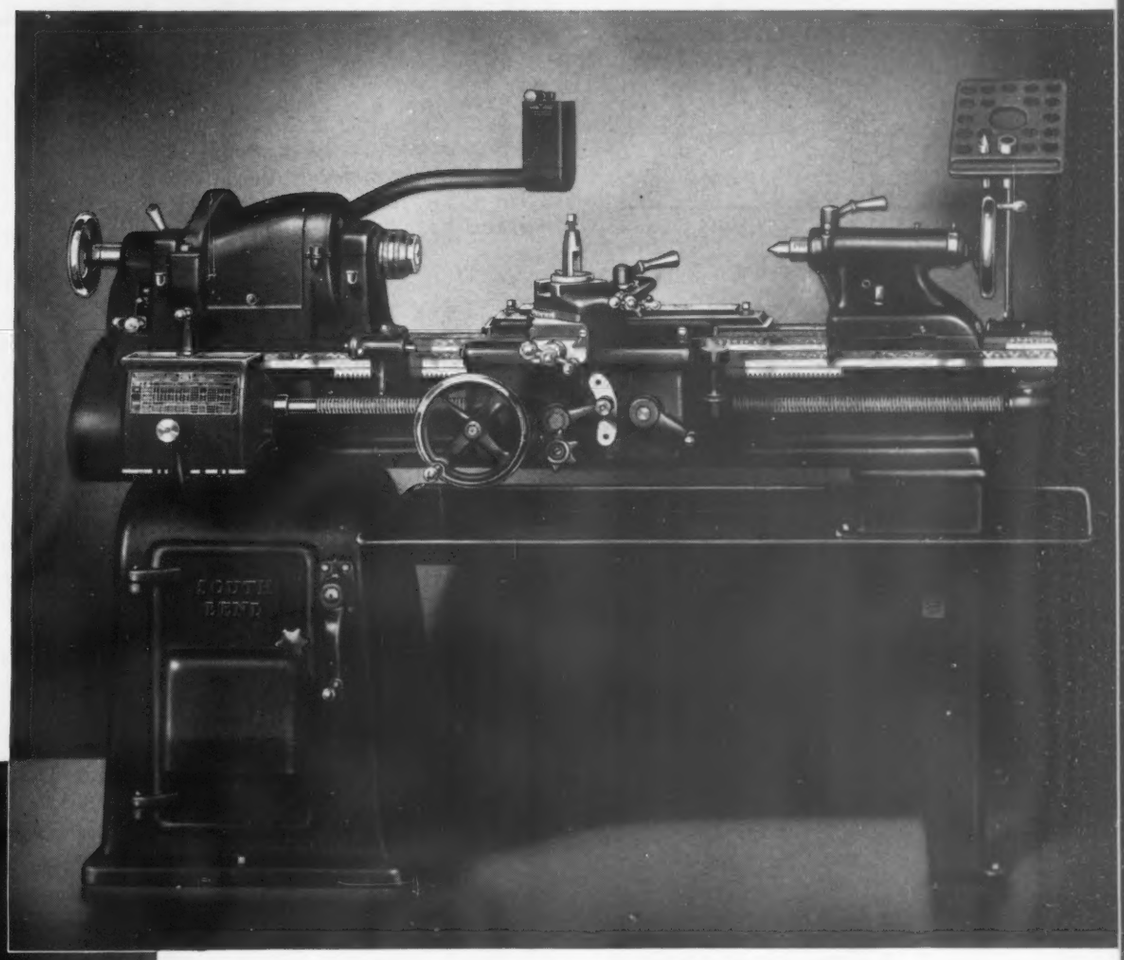
★

EASE OF OPERATION

★

VERSATILITY

★



13″ x 5′ South Bend Underneath Motor Driven Tool Room Lathe.

TIME is precious these days. The success of our national defense plan depends on maintaining heavy production schedules—there is no time to lose.

When you need increased production, when your tool room is rushed beyond its capacity, you can save time with South Bend Lathes. Their wide range of spindle speeds permits machining work with maximum cutting tool efficiency—their unquestionable accuracy assures uniform precision—their ease of operation reduces fatigue and prevents mistakes—their versatility facilitates quick changeover from one job to another.

South Bend Lathes are made in five sizes, 9″, 10″, 13″, 14½″, and 16″ swing. All sizes are supplied with tool room or manufacturing equipment. Write for catalog and name of our nearest dealer.

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LATHE BUILDERS FOR THIRTY-FIVE YEARS

TRADE MARK SOUTH BEND ENGINE LATHES

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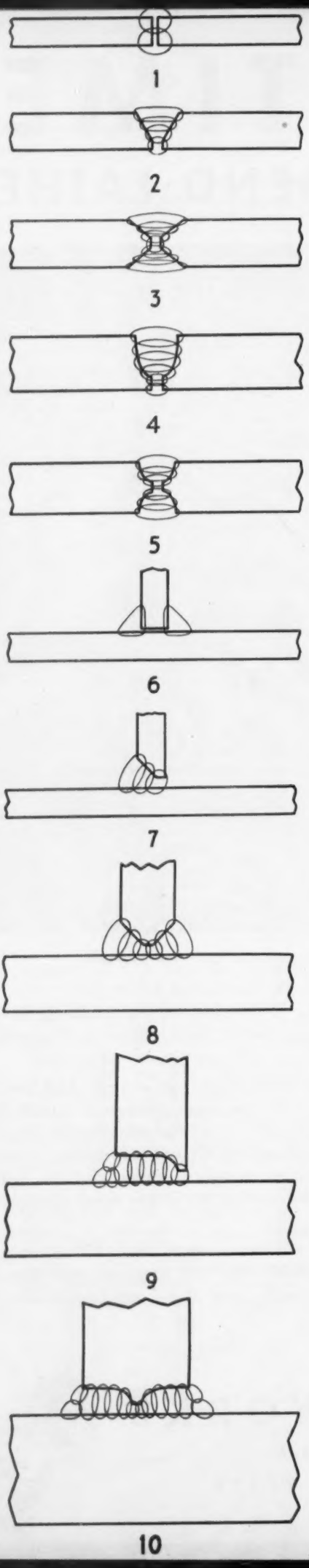


How To Get the Most from ARC WELDING

—Section VI—

Joint selection is of utmost importance since upon it hinges the amount of time, labor and cost involved in joint preparation. Mr. Smith shows how to evaluate the various factors involved and explains how the various types of joints influence joint preparation

By E. W. P. SMITH
Consulting Engineer
The Lincoln Electric Co.
Cleveland

■ SINCE the time, labor and cost involved in *joint preparation* are influenced by the type of joint, careful consideration should be given to *joint selection* when designing the fabrication. The selection of the type of joint to use in a particular application is governed by three factors:

—The load and its characteristics; that is, whether the load is in tension or compression, and whether bending, fatigue or impact stresses in any combination are present.

—The manner in which the load is applied; that is, whether load application is steady, variable or sudden.

—The cost of the joint preparation and welding.

Obviously the joint to select is the one which meets the load requirements and yet costs the least. To aid in selecting the best joint for given service conditions and lowest cost, the following detailed discussion of the principal types of joints is presented:

Butt joints are of several types, each having a number of variations. However, the general classification lists butt joints as square, V-bevel, U and J.

The square butt joint, Fig. 1, is suitable for all usual loads but requires full and complete fusion particularly when the load is of the type tending to produce fatigue failure or where the load is intermittent. The base metal for this type of joint must be good weldable steel since a large portion of the base metal is melted during welding. The thickness of plate on which the square butt joint is used is generally ⅜-inch or lighter when welded with a metallic electrode and ¾-inch or lighter when welded with a carbon electrode although this type of joint has been used on other plate sizes. Preparation for welding this joint is simple, requiring only a matching of the edges of the plate, separated by a distance dependent upon the plate thickness. Because of this simple preparation, the square butt joint is low in cost.

The single-V butt joint, Fig. 2, is suitable for all usual load conditions. It is generally employed with plate thicknesses considerably greater than the square butt joint—⅜-inch or heavier—although its use on thinner plate is not unusual. Preparation is more costly then the square butt joint and more electrode is used in welding.

Requires Less Electrode

The double-V butt joint, Fig. 3, is suitable for all usual load conditions. It is used for plates of greater thickness than the single-V and for work which can be welded from both sides. Cost of preparation for welding is higher than for the single-V butt joint but on the other hand the double-V requires only about half as much electrode. Cost of machining should be weighed against the cost of welding and the joint selection made accordingly.

The single-U butt joint, Fig. 4, is suitable for all usual load conditions and is used for work of the highest quality. It replaces the single or double-V joint for joining plates ½ to ¾-inch thick, although it is also used on heavier plate. For plates of this thickness, the single or double-V joints would require a considerable amount of weld metal. Machining the plates for a single-U joint reduces amount of weld metal needed but increases machining costs. The joint is welded from one side except for a single bead which

Fig. 1—Square butt joint. Fig. 2—Single-V butt joint. Fig. 3—Double-V butt joint. Fig. 4—Single-U butt joint. Fig. 5—Double-U butt joint. Fig. 6—Square-T joint. Fig. 7—Single-bevel T-joint. Fig. 8—Double-bevel T-joint. Fig. 9—Single-J T-joint. Fig. 10—Double-J T-joint

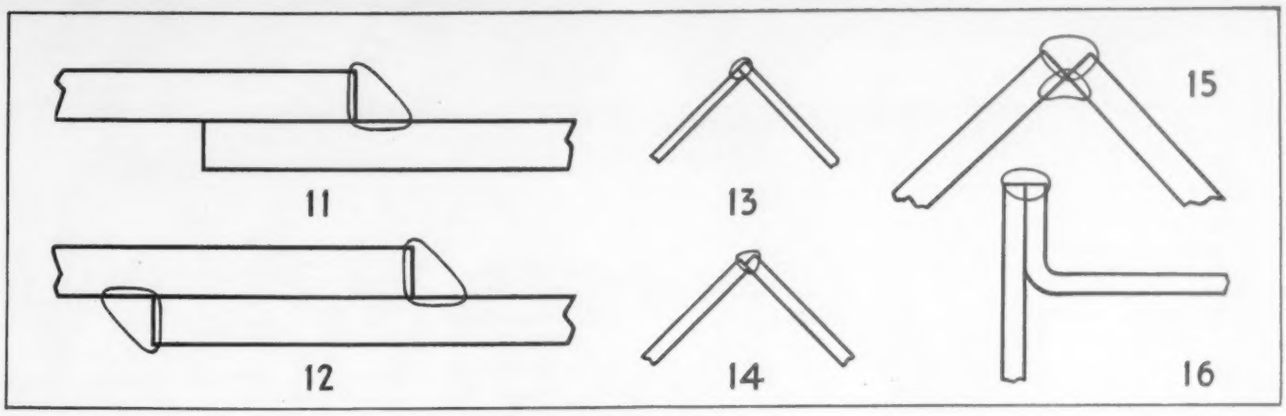


Fig. 11—Single fillet lap joint. Fig. 12—Double-fillet lap joint. Fig. 13—Flush corner joint. Fig. 14—Half-open corner joint. Fig. 15—Full-open corner joint. Fig. 16—Edge joint

is put in last on the opposite side from the U.

The double-U butt joint, Fig. 5, is suitable for all load conditions and so is used for welding heavy plates—¾-inch and thicker—where the welding can be done from both sides. This joint requires less weld metal than the single-U type but costs more to machine. Choice between double-U and double-V should be made by comparing the machining and welding costs of the two, then selecting the joint which costs less.

The square-T joint, Fig. 6, corresponds to the square butt joint in that no machining of plates is required. The square-T is used for all ordinary plate thicknesses, principally for loads which place the welds in longitudinal shear. For severe impact or heavy transverse loads, the nonuniform stress distribution of the joint should be kept in mind and the stress intensity of the application duly considered. The square-T type of connection requires more weld metal and therefore has higher welding cost than other types of T-joints.

The single-bevel T-joint, Fig. 7, is suitable for much more severe loads than the square-T due to its better distribution of stress. It is employed, in most instances, for welding plates ½-inch or thinner in work which can be welded from one side only. While more costly to machine than the plain T-joint, the single-bevel T joint is lower in electrode costs.

The double-bevel T-joint, Fig. 8, is suitable for heavy loads in longitudinal or transverse shear in joining heavy plate where welding can be done from both sides. The double bevel type is somewhat higher in machining cost than the single-bevel T-joint but has lower electrode cost than some other types such as the plain-T.

The single-J T-joint, Fig. 9, is suitable for severe loads, and while it may be used for usual size plates, is generally applied to plates 1-inch and heavier. The welding is done from one side only. However, it is advisable to put in a final finish bead on the side opposite the J. Although somewhat more costly to machine than the single-V, the single-J T-joint is lower in electrode cost.

The double-J T-joint, Fig. 10, is suitable for exceedingly severe loads of all types in heavy plate—1½-inch and heavier—where welding can be done from both sides. Although the machining costs for the double-J T-joint are higher than for other types of T-joints, less electrode is required, consequently the cost per joint is reduced.

The single-fillet lap joint, Fig. 11, is frequently used and has the advantage of requiring practically no machining to fit the edges of the plate. When fatigue or impact loads are encountered, stress distribution should be studied carefully. Where loading is not too severe, the single-fillet lap joint is suitable for welding plate of all thicknesses.

Takes Severe Loads

The double-fillet lap joint, Fig. 12, is suitable for load conditions much more severe than can be met by the single-fillet lap joint. In general, the two fillets should be full size, although one fillet may be smaller than the other in some instances. Because of its lower cost, the double-fillet lap joint is widely used. For extremely severe loads, the butt joint, Figs. 1 to 5, should be used.

The flush corner joint, Fig. 13, is suitable where loads are not severe, or in welding plate 12-gage and lighter. Although permissible for use on heavier plates, care should be taken that loading is not excessive.

The half-open corner joint, Fig. 14, is suitable for loads where fatigue or impact are not severe. This joint is generally used on plates heavier than 12-gage where the welding can be done from one side only. The "shouldering" effect of this type of joint aids welding by reducing the tendency to burn through the plates at the corner.

The full-open corner joint, Fig. 15, is suitable for severe loads in welding plate of all thicknesses where the welding can be done from both sides. When properly made, this joint is of such shape as to provide good stress distribution, thus permitting its application to fatigue or impact loads of all types.

The edge joint, Fig. 16, is used in joining plates ¼-inch or thinner for light loads. Careful consideration must be given to the load conditions, especially where impact and fatigue loading are encountered, as this type of joint is not suitable for severe loads.

Seeks Suggestions on Welding Instructions

■ A proposed code of minimum requirements for instruction of welding operators has been published by the American Welding Society, 33 West Thirty-ninth street, New York. Dealing with arc welding of steel, it has been introduced by the committee for the purpose of evoking comments, suggestions and criticisms, and has not yet been approved by the society. Those interested in submitting criticisms should get in touch with M. M. Kelly, secretary. All comments must be received not later than Nov. 1 to receive consideration.

Announces New Line Of Carbide Tipped Tools

■ To meet demands for carbide tipped cutting tools more rapidly, Tungsten Carbide Tool Co., subsidiary of Michigan Tool Co., 7171 East McNichols road, Detroit, announces a complete line of standard "stock" tools comprising six styles and 46 stocked sizes. All have diamond ground edges and are ready for immediate use.

Types suitable for cast iron, nonferrous metals and for steel are included in the line. The tools are designed to cover most turning, boring and facing requirements and may be readily converted by the user into special shapes by grinding.

All styles and sizes in four grades are now available for immediate shipment, and other grades of Vascaloy, Carboloy, Kennametal, or Firthite, while available at no increase in price, can be delivered within one week on special order.

Conserving Tungsten

(*Concluded from Page 82*)

and the exhaust valves for aircraft engines are made from an alloy containing tungsten, but the committee indicated that any change at this time would be inadvisable despite the fact a relatively large quantity of a molybendum steel is also being used for these purposes.

Substitution of molybdenum for tungsten in armor-piercing projectiles and bullet inserts is now under study. Col. S. B. Ritchie, Watertown arsenal, reports that complete substitution can be effected if the necessity arises, provided that some sacrifice in ballistics efficiencies can be tolerated and possible production difficulties overcome. There is no requirement of tungsten in armor plate, according to Colonel Ritchie.

Quantities of tungsten consumed in manufacture of permanent magnets and such electrical equipment as lamps, X-ray tubes, radio tubes, etc., are reported as very small and in most instances there is no opportunity for substitution of molybdenum.

Finds Molybdenum Good Substitute To Relieve Tightness in Vanadium

■ APPARENT tightness in vanadium has been caused primarily by substitution of SAE 6100 steels, containing chromium and vanadium, for nonobtainable nickel-containing steels.

This is the conclusion reached in a report submitted at the request of OPM by the advisory committee on metals and minerals of the National Research Council, National Academy of Sciences.

In the great majority of cases where vanadium steels have been substituted, equally serviceable substitutions are said to be had in molybdenum or molybdenum silicon steels with a grain-refining addition of aluminum. This saves chromium as well.

Aluminum for this purpose need not be pure primary aluminum, the report states. Secondary aluminum, or what might be termed "complex ferro-aluminum," made from ores or waste products that can not be economically purified for manufacture of aluminum, will serve equally well. There is an abundance of these low grade raw materials for ferro-aluminum.

"There is no such abundance of domestic vanadium ores and these ores should not be used for purposes in which they can be substituted, to guard against future scarcity in another emergency," the report continues. "Peruvian ore comes in over a relatively long shipping route, longer than that for high-grade bauxite, so it would be better to have further expansion, even in pure aluminum than in vanadium.

"It is more economical to produce aluminum or ferro-aluminum, than ferro-vanadium. The vanadium ores are low in vanadium, and it takes more ultimate man-hours to produce vanadium than aluminum, as is reflected in the prices, $2.75 per pound of contained vanadium, against 17 cents per pound of aluminum.

"Various minor uses of vanadium are too small and too important to deserve much effort for substitution. The main uses are (1) in tool steels, especially high-speed steel, (2) in Army, Navy and Air Corps direct requirements, (3) in civilian uses, largely as substitute for other scarce metals. Roughly a third of the present production is required for (1). This use is almost nonsubstitutable. The requirements for (1) can hardly increase very fast as they are limited by the tool steel producing equipment and the time necessary to increase it.

"Less than a third appears likely to be needed for (2) on the basis of present estimates of requirements. Perhaps some of the uses under (2) are substitutable. The Services should be urged to continue their search for substitutes applicable to their uses. For minor uses and engineering steels in category (3), more than a third is available, and this is roughly double the normal consumption in such uses prior to 1940.

"These feasible and necessary substitutions can most readily be brought about by enlisting the cooperation of the alloy steel mills producing engineering steels in seeing to it that their customers are not given vanadium-containing steels when vanadium-free steels will serve.

"Metallurgical engineering judgment is needed in appraising each particular use. The sales engineers of the alloy steel producers are generally qualified to exert this judgment. A blanket ban on use of vanadium would bar several truly essential uses. Providing unlimited vanadium for unrestricted use would be poor conservation and poor economics."

Electro-Tinning

(*Concluded from Page 69*)

34 per cent tin and 38 to 40 per cent tin, respectively.

Usually the impurities present in commercial stannate are not harmful in the plating bath, but occasionally they may cause trouble. Oxidizing agents tend to lower the cathode efficiency of stannate baths. Sodium nitrate if present to the extent of 2 grams per liter will lower the efficiency by about 20 per cent, while 20 grams per liter will reduce the efficiency by 80 per cent. Its adverse effect, however, wears off gradually when the bath is in use. Chlorides are not harmful in the plating bath unless present in amount over 50 grams per liter, when they can cause a slow breakdown of the oxide film on the tin anodes. Small amounts of metallic impurities are harmful only if they are soluble in the alkaline solution, like antimony, arsenic or, in a less degree, lead. Small amounts of these metals if present will tend to plate out on the cathode and cause dark coatings.

Detection of impurities in stannate is as follows:

Nitrates: A sample of the stannate is warmed with a few cubic centimeters of caustic soda solution and a piece of aluminum in a small flask. If nitrates are present ammonia is evolved, which can be detected by its smell or with litmus paper. Using a 5-gram sample of stannate, sodium nitrate can be detected when present to the extent of 1 per cent or over.

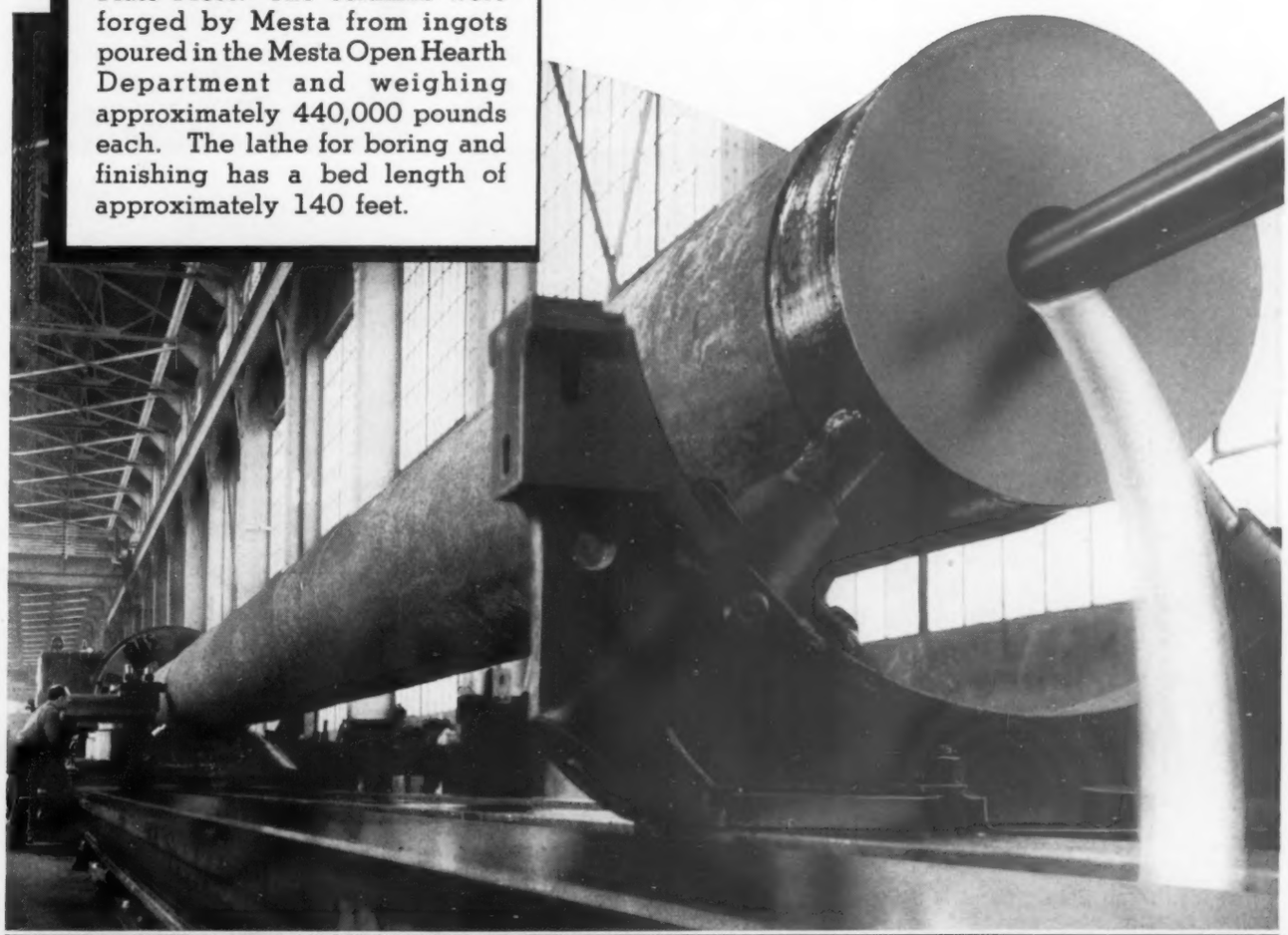
Antimony and Arsenic: A simple method is to place a copper strip (cleaned by dipping in nitric acid) in a sample of the stannate dissolved in hydrochloric acid. On warming, metallic antimony or arsenic is precipitated as a gray coating on the copper. (In small amounts antimony appears as a characteristic purple color—Cu_3Sb.) Dissolving a 1-gram sample of stannate in 5 cubic centimeters of water plus 5 cubic centimeters of hydrochloric acid, it is possible to detect antimony or arsenic if present to the extent of 0.2 per cent or over. (The metallic precipitate should not be confused with a slight blackening which occurs if the copper is tending to dissolve in the hydrochloric acid due to the presence of an oxidizing agent, e. g., nitrate or hydrogen peroxide.)

Lead: Dissolve a sample of stannate in a few cubic centimeters of caustic soda solution (5 per cent), filter, and add one or two drops of dilute ammonia sulphide. Using a 1-gram sample of stannate dissolved in 10 cubic centimeters, 0.5 per cent lead or more gives a distinct black precipitate.

MESTA

Heavy Forgings

ONE of the four columns required for a 14,000 ton Armor Plate Press. The columns were forged by Mesta from ingots poured in the Mesta Open Hearth Department and weighing approximately 440,000 pounds each. The lathe for boring and finishing has a bed length of approximately 140 feet.

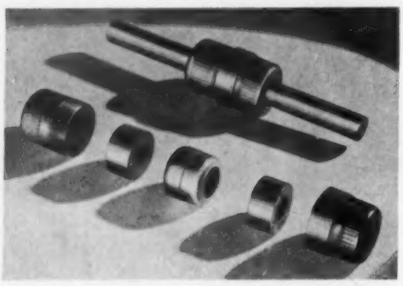


MESTA MACHINE COMPANY · PITTSBURGH, PA.

Industrial

Drive Shaft Couplings

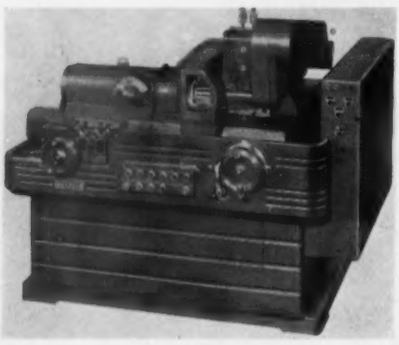
■ Harris Products Co., 5435 Commonwealth avenue, Detroit, has introduced new Torflex flexible drive shaft couplings which are said to be silent in operation, requiring no lubrication oil boots or periodic inspections. They each consist essentially of two metal caps, two rubber bushings and a metal spacer. The



bushings fit over the ends of the shaft. When the metal caps are screwed together, they force the rubber bushings against the metal spacer. This, in turn, tightens the bushings on each shaft sufficiently to furnish a slip-proof drive capable of transmitting torque. Assembly is completed by tightening each coupling cap with two ordinary pipe wrenches. The couplings are being offered for shaft diameters ranging from ¼ to 1¾ inches. A feature of these units is that only one shaft requires any preparation. This consists merely of grooving the shaft to a depth of 1/16-inch.

Thread Grinder and Tool Grinding Machine

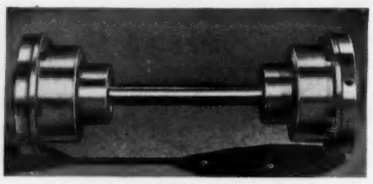
■ Ex-Cell-O Corp., 1200 Oakman boulevard, Detroit, has introduced two new products—a 39-A thread grinder and a tool grinding machine. The former is for internally threaded work, and is automatic in operation. It grinds threads up to 5 inches in length within a distance of 15½ inches from the work spindle



nose. Maximum hole ground is 9½ inches with a minimum of 1-inch. Maximum swing is 10 inches. In addition, a taper attachment allows grinding up to maximum of 4 inches in diameter per foot on the effective thread length. The second development is a new heavy-duty style 49 double end tool grinder, for carbides and tools of other materials. It carries 14-inch wheels, and can be equipped for either dry or wet grinding.

Piloted Coupling

■ Falk Corp., Milwaukee, announces a new Steelflex type P piloted coupling for floating shaft requirements. It is especially adaptable for use in paper mills, on steel mill auxiliary drives, on main rolling mill drives, horizontal and vertical pumps and exhaust draft fans. Constructed entirely of steel, the coupling consists of two hubs, one of which carries an integral flange to which the cover is secured, a special tempered steel member form-



ing a complete cylindrical grid member and flanged steel cover secured to the hub flange with capscrews. It is available in three types—single piloted, double piloted horizontal and double piloted vertical.

Electronic Robot

■ Max Mosher, 130 West Forty-second street, New York, has introduced an electronic robot for controlling mechanical feeding of pulverizing machinery. It comprises a control unit housed in a drawn shell steel case, which connects to the magnetic contactor switch of the feeder motor operating the mechanical feeder. The control is set for the full load current of the grinder motor, and keeps check through its load-range regulator. A special current transformer is supplied, adjusted for the normal full load current of the grinder motor. This is the only accessory equipment required in addition to the feeder motor magnetic contactor switch. A white signal light on the control panel indicates operation of the control. The load range regulator has a range of from 50 to 125 per cent of the grinder mo-

tor, full load. Once the maximum load is set for a material, however, the controller keeps close tabs on the limit. A red light showing continuously indicates that the grinder is not discharging. The panels are built in capacities up to about 25 horsepower on the grinder motor and for about 5 horsepower on the feeder motor. Standard voltages range up to 550 volts. The control proper operates from a 110-volt 60-cycle line.

Surface Plate

■ South Bend Tool & Die Co., 1916 South Main street, South Bend, Ind., announces a surface plate for use in machine shops. Cast in semisteel and measuring about 48 x 96 inches,

it offers seven specific support-points for utmost flexibility. Two sizes of adjustable blocks or legs

Equipment

(10 inches and 12 inches) provide possible working-surface heights between 29 and 33 inches. The blocks support threaded 1½-inch screws, each topped with a circular cap which is recessed to contain any of the projecting support-points on the bottom of the plate. A 12-pitch thread provides fine adjustment to compensate for floor irregularities, etc. Five of these blocks are provided with each surface plate. The ribbed under side of the plate is designed to provide maximum strength without excessive weight. The unit weighs 3 tons.

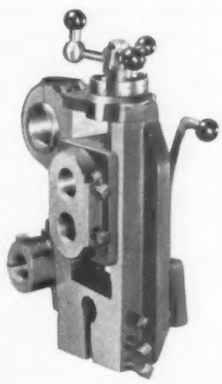
Stamping Unit

■ Acromark Corp., 251 North Broad street, Elizabeth, N. J., has placed on the market a new Acromarker model for numbering and lettering name plates, parts, instru-

ments, castings, gages and scales. It is sturdy enough to stamp lettering and numbering into steel castings and stainless steel, and can be operated by unskilled help after a few hours' practice. Dies for sizes of 1/16, 3/32, 1/8, 5/32 and 3/16-inch for the marker can be delivered immediately.

Turret Lathe Tool

■ Gisholt Machine Co., 1217 East Washington avenue, Madison, Wis., has introduced a new heavy-duty adjustable turning head for turret lathes. Tool is designed for turning and boring work, accommodating standard cutter holders in one of the two holes on the slide, as well as additional tool holders in the auxiliary slide mounted at the rear. It also provides for mounting of a drill or boring bar, together with a facing cutter. The main slide of the head is adjusted to size by a ball crank handle,



fitted with a large micrometer dial and observational clips. A long binder lever locks the slide, permitting heavy accurate cuts. The auxiliary slide is adjustable vertically. An extra large overhead pilot bar, supporting the tool, can be mounted on the machine or on the tool itself.

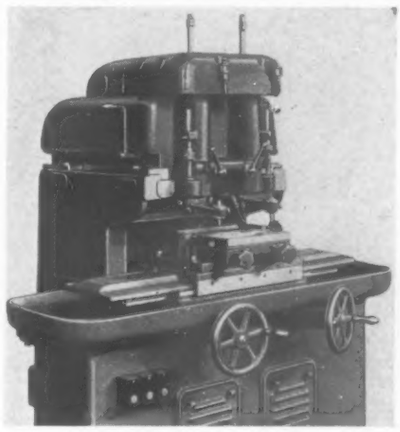
Emergency Light And Power Units

■ Electric Storage Battery Co., Nineteenth street and Allegheny avenue, Philadelphia, announces four new Exide emergency light and power units for industrial use. These feature split-second operation and absolute dependability. The new units, which are available in capaci-

ties of from 3400 to 10,000 watts, are particularly adapted to industrial plants engaged in defense work where interruption of the normal source of power may result in much damage. Other systems are available in capacities ranging from 240 to 100,000 watts, including those for safeguarding the continuity of highly important manufacturing processes during interruptions in the normal alternating current supply. Operating and maintenance costs are extremely low. Battery life ranges from 8 to 14 years, depending upon type of battery selected.

Hand Profiler

■ National Broach & Machine Co., 5600 St. Jean street, Detroit, has introduced a new Red Ring hand profiler for use in the production of intricate mechanical parts such as those incorporated in the breech mechanism of small arms and machine guns, also for certain aircraft parts and bearings. It duplicates in the work the profile of a master pattern by guiding an end mill. The machine's head carries two cutter spindles 10 inches on centers. These can be used simultaneously. To trace the path of an irregular curve with the cutter, movement must be provided in two directions in the horizontal plane. The head carrying the cutter spindles moves toward and



away from the operator as he faces the machine. Simultaneously, the table which carries the work and has capacity for two work fixtures moves laterally at right angles with the path of head movement. Movement of head and table in horizontal planes is accomplished by manipulating hand wheels located at the front of the machine. Wheel rotation is transmitted to these moving elements through helical gears and racks. Contributing also to the positive motion of head and table are the bearing and slide adjustments to prevent back-lash or lost motion. Each spindle also has a micrometer adjustment for the depth of cut and each is spring counter-balanced for instant retraction when its locking handle is released. The vertical cutter feed is actuated by cranks at either side of

the head. In addition, five spindle speeds are available. The drive is by means of V-belts with each spindle having its own motor. The follower pin, which, in operation contacts the contour of the master pattern is tapered on a 6-degree angle to correspond with the angle on which the sides of the master pattern are cut. In addition to a vertical adjustment, it has a 1/16-inch lateral adjustment to compensate for changes in cutter diameter due to sharpening.

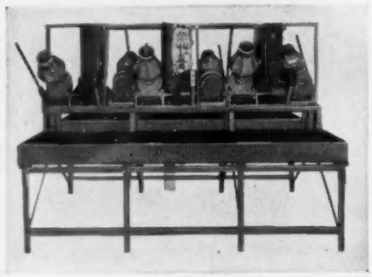
Enclosed Press

■ E. W. Bliss Co., 1420 Hastings street, Toledo, O., is presenting to manufacturers a new 2-point enclosed type press for heavy-duty

work. Of 4-piece tie rod construction, it has a capacity of 315 tons and measures 84 inches between uprights. The press' double gearing is designed to run in a bath of oil. Its crown bed, slide and uprights consist of steel castings. Other features of the unit include a hydraulic friction clutch, hydraulic brake and an air counterbalance.

Tumbling Equipment

■ Hanson-Van Winkle-Munning Co., Matawan, N. J., has introduced a new tumbling mill setup for removing burrs on machine gun parts. It consists essentially of several Mercil type octagon shaped cast iron tumbling barrels motivated by ½-horsepower motors, perforated trays and a drain tank. Both the trays and tank are located directly underneath the barrels as shown in the accompanying illustration. The operator in unloading merely empties the contents of the barrels into the trays, flushes them with water, sending both water and residue into the tank underneath. Directly connected to a worm and gear reducing unit, the bottle-necked barrels are revolved by the slow speed shaft



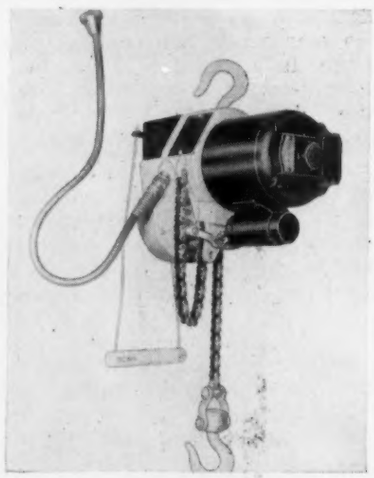
on the worm gear, the parts to be processed being run with silica sand and oil. Each of the barrels present a 5¼-inch opening at the top and measure 13¾ inches deep and 9½ inches across the flats.

New Housing For Slotmaster

■ Experimental Tool & Die Co., 12605 Greiner avenue, Detroit, announces that its Universal Slotmaster is now provided with a cast iron housing instead of an aluminum one. The change in no way impairs the efficiency of the slotting head, according to the company.

Reversing Motor

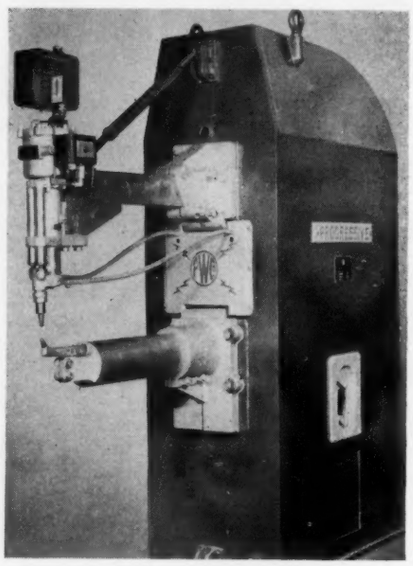
■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is offering a new capacitor-start reversing motor for use on cranes, hoists, lathes and other industrial applications where instantaneous reversing is necessary. Available in rating from 1/6 to 3/4-horsepower, single phase 60 cycle, it operates at 1725 revolutions per minute on 115 and 230-volt circuits. The motor does not make use of brushes or



commutators and, in reversing, it requires a special centrifugal-starting switch with two contacts, a solenoid relay, and a resistor, all of which are furnished. Greater torque during the starting and accelerating period of the motor is obtained since the capacitor is placed immediately on the auxiliary winding circuit. The circuit also protects starting winding from damage and possible motor burnout.

Deep-Throat Welder

■ Progressive Welder Co., 3100 East Outer drive, Detroit, has introduced a variation of its pedestal welder which facilitates resistance spot welding inside of deep assemblies such as barrels and tanks of various types. For this purpose, its lower arm is built of heavy tubing and fitted with a replaceable adaptor for the lower electrode. This construction makes unnecessary the use of supports for the lower arm, and also

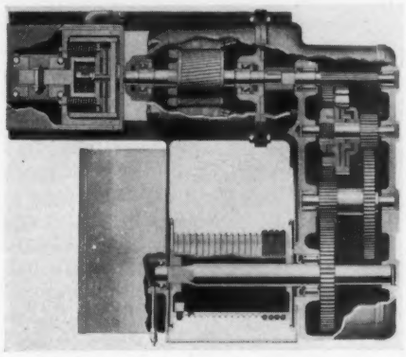


makes it possible to slide deep assemblies over the arm to full throat depth. The upper arm carrying the upper electrode and gun assembly, is of the conventional type. Both arms may be adjusted in or out to increase or decrease throat depth. Other features include positive hydraulic or air-hydraulic pressure at the electrodes; nonmagnetic head construction, straight-line movement of the upper electrode; provision of nonflicker pressure switch and positive cooling circulation. This unit is available in standard capacities of 75 and 150 kilovolt.

Steel Type Hoists

■ Robbins & Myers Inc., Springfield, O., has developed a new type F-½ steel hoist designed to occupy a minimum of headroom space with maximum lift power. It is built in 1000 and 2000-pound capacities with all gears and shafting of alloy steel. The main frame of each hoist consists of a welded steel plate. Units in both capacities are powered by

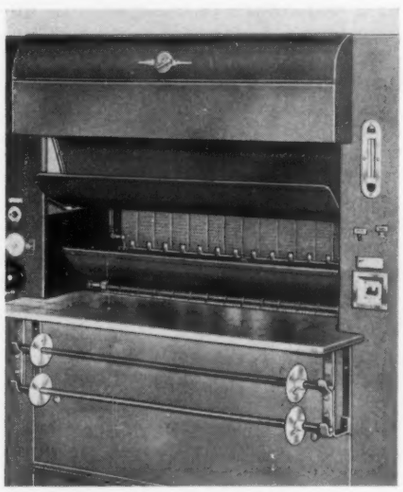
a high-torque motor. They are controlled by means of push-button pendant with single or two speeds. A load brake automatically controls the speed when the load is lowered. If power fails, it prevents the load



from dropping. The new hoist can be applied to any make of monorail. Motor driven trolleys with speeds of 60 to 100 feet per minute at single speed and with push-button can be provided.

Whiteprint Machine

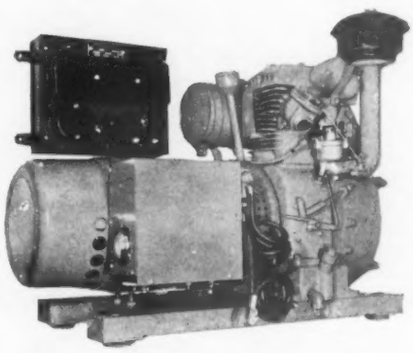
■ Ozalid Products Division, General Aniline & Film Corp., Johnson City, N. Y., has introduced a new model C automatic whiteprint machine synchronized to print and develop sensitized materials at speeds up to 12½ feet per minute. Geared to operate continuously it is constructed for either front or rear delivery of prints. This allows operator to feed original and sensitized material into the front and receive the finished prints either on a delivery tray in front, or on a sorting table at the rear of the machine. An automatic device separates the sensitized material from the original. It removes the original from the ma-



chine after it has come through the printer, allowing the printed material to be carried through the developer. A blower removes hot air from the printing cylinder, cools the burner and creates a vacuum necessary for the automatic separator. A slight vacuum inside the machine prevents leakage of ammonia fumes. Also included in the machine is an adjustable burner shade to allow variations in light intensity without changing the printing speed. The model accommodates materials up to 42 inches wide. It requires only 19 square feet of floor space.

Stand-By Plants

■ Kato Engineering Co., Mankato, Minn., announces a new line of stand-by plants models 14A, 26A, 28A, and 30A for lighting and supplementary power purposes. Each model provides 600, 1000, 1500 and 2000 watts respectively. Generators are of the self-excited single phase type. These units are really two-plants-in-one, furnishing standard 110-volt 60-cycle alternating current or a good source of direct current at a usable voltage. Powered with a Briggs & Stratton 4-cycle single-



cylinder air-cooled engine, the units feature economical operation, fuel consumption being in approximate proportion to amount of load being run. The generators are bolted to the engine crankcase. The units are available with remote control or full automatic control if desired.

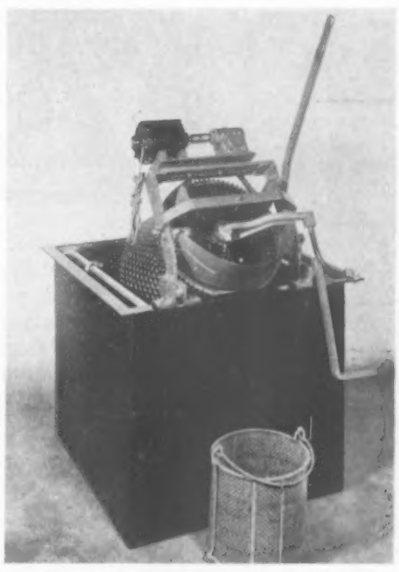
Aircraft Arc Welder

■ Hobart Bros. Co., Troy O., has introduced a specially designed arc welder for aircraft construction purposes. Although it embodies the same design and operating speed (only 1750 revolutions per minute) as other multirange arc welders, it is modified to give the "quick hot start" necessary for welding light gage alloy tubular members. It also provides a lower range of welding current specified from 10 to 150 amperes at normal welding voltage. Characteristics of this machine make it especially suitable for welding X-4130 chromium molybdenum steel on aircraft engine mounts. Also dual control of welding current and open circuit voltage enable the operator to select exactly the right volt-ampere combination for each job. The new welder has four laminated main poles and four interpoles. It measures only 28½ inches high and 17 inches wide, and

is furnished with convenient links for voltage changeover from 220 to 440 volts or vice versa. Models also are available in either stationary or portable types.

Barrel Plating Unit

■ Udylite Corp., 1651 East Grand boulevard, Detroit, has introduced a new Multi-Purpose barrel plating machine for use in cleaning, drying, plating, rinsing or pickling operations. It does not have any bearings below the solution level, and removal of cathode contacts for cleaning is a simple, quick operation. The cylinder of the unit has room for large loads. Its 125-gallon tank measures 32 x 36 x 30 inches, and



the cylinder 23 x 23 inches, the latter having a 16-inch opening. Capacity of the plating unit is 50 to 70 pounds. It is powered by a 1/6-horsepower 110-volt single phase 60-cycle alternating-current motor.

Beryllium—Its Uses

(*Concluded from Page 64*)

per cent with a cobalt addition of 0.13 per cent and heat treating at a somewhat higher temperature, a more favorable combination of tensile strength and elongation can be obtained. For example a ½-inch bar stock of this alloy, cold drawn 40 per cent and then heat treated 3 hours at 700 degrees Fahr., will show the properties listed in Table II.

Somewhat different properties are obtained in the case of beryllium copper forgings. Hot forged bars of an analysis containing 1.88 per cent beryllium, 0.25 per cent cobalt and the balance copper when heat treated for 3 hours at 700 degrees Fahr., after a 3 hour solution and quenching treatment at 1450° Fahr., gave properties in Table III.

Casting Difficult: Application of beryllium copper to sand castings has been limited. Highly erratic properties were obtained in early attempts to produce castings, although more recently it has been found that additions of iron group metals, particularly cobalt, and in some cases a small amount of silicon, have proved beneficial. One of these alloys, a composition containing .45% beryllium, 2.6% cobalt, balance copper, appears to offer possible uses where heat conductivity is a factor or where resistance to heat-checking under frictional contact with materials used for brake blocks or clutch facings is desirable.

Investigations of beryllium nickel have been carried on in this country for a number of years, and while the material is not yet available commercially, it has been produced successfully in Europe. The fact that higher physical properties are obtained than in the case of copper base alloys points to prospective applications. An alloy in strip form of 1.8 to 2 per cent beryllium, balance nickel, shows the mechanical properties reported in Table IV.

The high modulus of elasticity and corrosion resistance of beryllium nickel, considered with the very unusual combination of tensile strength and elongation, appear to offer possibilities of using highly stressed thin sections of this material to obtain weight savings. Cost does not enter as a deterring factor in the production of beryllium nickel as it does in the case of beryllium aluminum since beryllium contained in nickel can be made directly from the oxide, similarly to the copper alloys.

Applications of Beryllium Copper: Most numerous applications of these alloys in recent years have been for various types of springs, clips, electrical contacts, diaphragms, and the like. The material provides a relatively low elastic modulus compared with steel, coupled with a very high 0.2 per cent yield point, thereby giving a wide amplitude of movement within the elastic range.

Such springs under sustained load will maintain constant pressure and deflection and under intermittent load will return to their original dimensions for extended periods. This exceptional "springiness" of the metal is technically termed freedom from elastic drift or hysteresis. The relatively good electrical conductivity of this material makes its use still more desirable for springs in telephone jacks, motor brush springs, vibrator rings, contact fingers, automobile breakers, and similar applications where both electrical and stress characteristics are important.

Savings in weight and size of manufactured products frequently result from this combination of properties since the high elastic limit of beryllium copper permits use of thinner and shorter sections of metal, particularly in flat springs.

Good Wear and Shock Resistance: Although probably best known for its adaptability as a spring material, the compressive strength of beryllium and its resistance to wear and

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shock are opening up a steadily growing number of applications where these factors are the primary considerations in selection of material. In fact, this market appears to offer the greatest possibilities at present for substantially broadening total consumption of beryllium.

Many instances of this type of service encountered in machinery and internal combustion engines are said to provide longer life to parts when alloys of 1.80 to 2.25 per cent beryllium are used. Such parts include heavily loaded bushings in contact with a hardened steel shaft of 58 rockwell C or more where the action is eccentric or reciprocating; valve seats and tappet rollers; resistance welding electrodes; cam stops; etc.

Utilized in Aviation Industries

For example, a beryllium-copper alloy is being used for the switch lever and latch on the indexing mechanism of an automatic screw machine. This switch lever is tripped by feed spools on a rotary feed mechanism, and because of the sharp impact there is a tendency for the lever and latch either to fracture or else to score the feed spools. Both of these troubles were reported overcome with the substitution of beryllium-copper castings, although the parts were heat treated to 40 rockwell C. In addition, it was found possible to use a smaller cross section than previously, this resulting in reduced inertia and a more satisfactory indexing period, while the cost was less than for the next best material tried.

Small ball bearings have been made of beryllium copper—including both the races and balls—for service in special aviation instruments where it is necessary to have a low friction nonmagnetic bearing. One of the more unique possible applications of beryllium copper under development recently has been for certain metal parts of an aviator's parachute. While these parts naturally must be strong, an important factor in suggesting this alloy's use was again its nonmagnetic property and consequent absence of interference with the plane's electrical instruments.

It is obvious that because of economic reasons beryllium copper cannot be considered for many applications for which it is ideally adapted, but where effect on total cost of the product is small or where its superior performance outweighs the added initial cost, there is a growing field of usefulness.

The beryllium industry appears still in its infancy, with ultimate possibilities of the metal's use—particularly in the form of alloys with metals other than copper—yet to be fully developed. To what extent its price can be reduced further depends partly on future demand and consequent enlargement in producing capacity, although it appears likely beryllium will remain a relatively expensive metal.

Beryllium copper is available in the following forms: Strip in widths up to 4 inches (wider widths on special order) and thicknesses down to 0.002-inch; wire in diameters down to 0.002-inch; rods cold drawn up to 2 inches in diameter and hot worked up to 3½ inches in diameter, and chill cast and turned up to 7½ inches in diameter.

Metalworking Companies In Purchasers Exhibit

■ Machinery and metalworking companies were well represented at the sixth annual Manufacturers' Exhibit, held in Lord Baltimore hotel, Baltimore, Oct. 21-23, under sponsorship of Purchasing Agents Association of Baltimore. They numbered one-third of 70 exhibitors.

The exhibitors' breakfast, Oct. 22, was attended by approximately 160 and was featured by an off-the-record address by Frederick Shelton, Kiplinger Washington Service.

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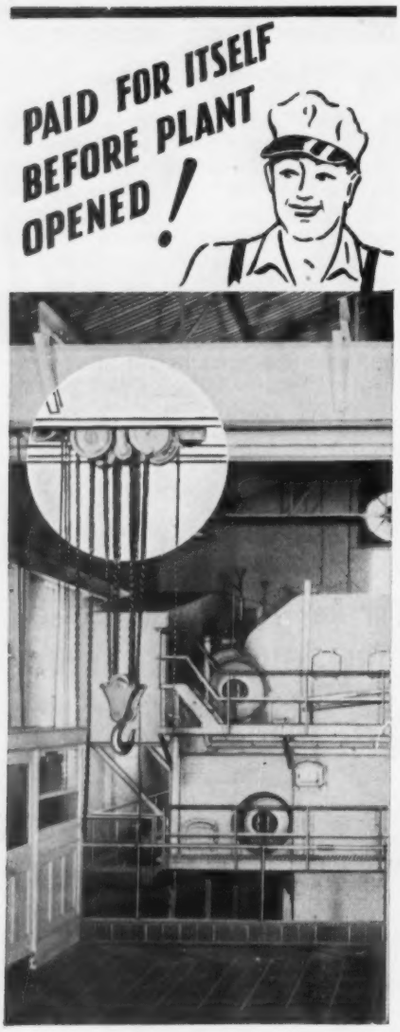


An old stable in Utah was being converted to a modern power house. First move was to install this 15-ton, 36' span Reading Crane. Then, with its help, 800 cubic yards of dirt were moved, 600 cubic yards of concrete poured, and two 18-ton, 250 H.P. boilers and two 500 H.P. uniflow engines installed, together with generators, exciters, etc.

"The crane was also used," says the Contractor, "for painting the ceiling and other purposes. Frankly, during the construction it saved the owner and ourselves more than its cost." Now it's standing by for coal and ash handling and emergency use.

No need to say more—just remember that it was Reading-designed and built—and there are more where it came from.

READING CHAIN & BLOCK CORP.
DEPT. 311 READING, PA.

READING
Chain Hoists, Electric Hoists,
Cranes and Monorails

Wire Association

(*Concluded from Page 27*)

president of the association, in opening the meeting pointed out that at least 40,000,000 man-hours had been lost on defense projects during the first seven months this year by labor disputes. More than 120,000,000 man-hours were lost on nondefense work and a conservative estimate for the first ten months would be 200,000,000 man-hours.

"Can we get our national defense and economic structure for our tremendous tax burdens strengthened on this basis?" Mr. Westphal asked.

Some of the various changes that have taken place in the wire industry during the emergency were described by K. S. Wyatt, cable engineer, Phelps Dodge Copper Products Corp., New York. Mr. Wyatt said that many substitute materials have been found to be highly satisfactory and that probably industry never will return to the use of the original material.

At a national defense luncheon, Rear Admiral W. T. Cluverius, president, Worcester Polytechnic Institute, Worcester, Mass., commented on the speed with which the armament program is being executed. In the East, he said, a ship recently was launched seven months ahead of schedule. An automobile manufacturer delivered certain ordnance materials three months ahead of schedule.

Speaking for industry, Dr. A. A. Stockdale, National Association of Manufacturers, said that America in a little over a year has almost caught up with Hitler's years of arming. Emphasizing that this country under a democracy has achieved the highest standard of living in the world, Dr. Stockdale pointed out that with only 7 per cent of the world's population, we have 80 per cent of the automobiles and one third of the railroads.

Speaking for the Army, Brig. Gen. A. W. N. Schulz, director of purchases and contracts in the office of the Under Secretary of War, mentioned the increase in capacity for producing field wire. Before 1938, he said, capacity did not exceed 1500 miles monthly. In July of this year, capacity was 24,742 miles. More than 300,000 miles have been purchased, one-half of which has been delivered.

Speaking for the government, Dr. C. I. Gragg, OPM consultant, directed attention to the fact that only $10,000,000,000 of the $60,000,000,000 appropriated has been spent on the defense program. In comparison with Great Britain and allied countries the proportion of our total productive capacity devoted to the defense program is small, he said.

Tanks Described to A.I.M.M.E. Members

■ Fast highly mobile armored tanks now being delivered to the army weigh 13 tons and are propelled by a 250-horsepower radial type gasoline or diesel engine, located in the rear. Each tank carries a crew of four and is armed with a 37-millimeter cannon and heavy and light machine guns and two-way radio, all protected by varying thicknesses of armor-plate which accounts for 30 per cent of the weight.

This information was revealed by G. K. Bradfield Jr., general superintendent, Ordnance Division, American Car & Foundry Co., at the annual autumn dinner of the Institute of Metals and Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers, Ritz-Carlton hotel, Philadelphia, Oct. 20-22.

Because the company with which the speaker is identified could not buy armor-plate prefabricated, it installed its own equipment and became the largest producer of case-hardened armor-plate in the world, not only supplying its own requirements, but those of other manufacturers, the speaker said.

Twenty-three technical papers were presented at the various sessions of the two groups, whose registration exceeded 150 members.

In air-cooled steels, addition of more than 0.5 per cent of chromium changes the pearlitic structure of the plain 0.35 per cent carbon steel to an acicular carbide-ferrite aggregate, and further addition of chromium promotes the formation of martensite. This was stated in a paper on "Influence of Chromium and Molybdenum on Carbon Steel," by R. F. Miller and R. F. Campbell, research laboratory, United States Steel Corp., Kearny, N. J.

The presence of 0.5 per cent molybdenum is more effective in forming the acicular structure and increasing the hardness than the presence of 0.5 per cent chromium, but further amounts of chromium are more effective than molybdenum in forming martensite.

The authors explained that the first traces of martensite are found in steels containing about 2.0 per cent of either chromium or molybdenum and with this amount of alloy their hardness is about the same. When both elements are present, chromium is more effective than the same amount of molybdenum in forming martensite and increasing the hardness.

Allocation Near in Steel Distribution

Mills seek to ship most needed material first. Strikes cut into production. Scrap situation causes further curtailment

MARKET IN TABLOID ★

Demand
High priority tonnage heavier.

Prices
Pressure for higher ceiling.

Production
Declined 1 point to 95½ per cent.

■ STEELMAKERS are paying greater attention to dates when high priority steel actually is to be used, in an effort to give deliveries to best advantage. So heavy has become the burden of top priority orders that schedules are difficult to formulate unless it is known which orders are needed earliest.

The situation has developed to a point where priorities mean relatively little and it is believed a broad system of allocations, as in pig iron, will be the only means to bring about efficient distribution. Already plates are practically under allocation and application to other products is believed near.

Substantial losses in steel production are the result of labor interference and lack of scrap is causing increased curtailment. Employes of Great Lakes Steel Corp. at Detroit were on strike more than a week, causing loss of 5000 tons of steel, 2000 tons of pig iron and 1400 tons of coke each day. Uncertainty is caused by strike at captive coal mines, called for Oct. 27, after a truce of 30 days following a strike in September. Coke ovens have about a month's supply of coal, which would avert blast furnace interruption for that period unless coke oven workers were drawn into the strike. Pig iron production in the Birmingham district was interrupted last week by strike of coke-oven workers.

Scrap shortage continues a major factor and interruption of steelmaking is becoming more frequent. Several open hearths have been shut down at Buffalo and similar action elsewhere has been averted by scrap being diverted to plants in need. Increasingly operations are being carried on without reserves, on the basis of daily shipments. The allocations plan has not been applied, awaiting reports from the industry. Fundamental differences between the scrap trade and other branches of the steel industry result in new problems when allocation is attempted. One result expected is diminution of direct dealing between producer and consumer, which has increased greatly in recent months.

Labor interruption at Detroit, which reduced production there to one-third capacity, and shutdown of several open hearths at Buffalo because of scrap shortage, caused the production rate to drop 1 point to 95½ per cent last week. Small increases at several other points were not sufficient to overcome the sharp drop at these points. Detroit rate declined 36 points to 32 per cent of capacity and Buffalo 9½ points to 83½ per cent. Cleveland also dropped 2 points to 97 per cent as an open hearth was taken off. Chicago advanced 1 point to 102 per cent, Pittsburgh 1 point to 99 per cent, Wheeling 1 point to 94 per cent and Cincinnati 3½ points to 91½ per cent. Rates were maintained unchanged at: St. Louis, 83; Birmingham, 95; Eastern Pennsylvania, 93; New England, 90; Youngstown, 98.

Lack of semifinished steel is limiting production of wire and wire products, the most apparent squeeze being in nails. Wood construction of cantonments and storehouses by the army has required an unusual quantity of nails and delivery for civilian purposes is now deferred several weeks.

Tin plate demand and production continue at a high rate after some labor interruption at the Gary mill. Supplies of plate for tinning are in better volume than recently. Users of copper, brass and aluminum for miscellaneous purposes are turning to tin plate as their usual sources of supply are not available. Army and navy buying for 1942 delivery is heavy.

Recent advance of a cent per pound in the ceiling price on zinc has added to difficulties of galvanized producers, their costs already high. As a result they believe they should be allowed a higher price. The spread between black and galvanized sheets is said to be far less than the cost of conversion.

September consumption of Lake Superior iron ore was at the high rate for August, though the total for the month was slightly lower, due to one less day of operation. Total consumption to Oct. 1 was 56,160,488 gross tons, compared with 44,228,922 tons in nine months last year.

For the third consecutive week automobile production last week registered a gain. Output was 91,855 cars, a gain of 6255 over the preceding week. A year ago the figure was 117,080 cars.

Composites continue unchanged, finished steel $56.60, iron and steel $38.15 and steelmaking scrap $19.16.

COMPOSITE MARKET AVERAGES

	Oct. 25	Oct. 18	Oct. 11	One Month Ago Sept., 1941	Three Months Ago July, 1941	One Year Ago Oct., 1940	Five Years Ago Oct., 1936
Iron and Steel	$38.15	$38.15	$38.15	$38.15	$38.15	$38.07	$34.67
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.60	53.90
Steelworks Scrap..	19.16	19.16	19.16	19.16	19.16	20.70	16.65

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Oct. 25, 1941	Sept. 1941	July 1941	Oct. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Oct. 25, 1941	Sept. 1941	July 1941	Oct. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.00	24.00	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$21.30
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	17.75	19.75
Heavy melting steel, Chicago	18.75	18.75	18.75	19.85
Rails for rolling, Chicago	22.25	22.25	22.25	24.05
No. 1 Cast, Chicago	20.00	21.50	21.50	17.55

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$4.75
Connellsville, foundry, ovens	7.25	7.25	7.25	5.75
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. mill, carloads.

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base .. 3.05c
Granite City, base 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. ... 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.
Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.
Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.
Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City
Field gr..	3.20c	3.95c	3.30c
Armat. ..	3.55c	4.30c	3.65c
Elect.	4.05c	4.80c	4.15c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	.....	*18.00	19.00	.....	.....
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
403	21.50	24.50	29.50	21.25	27.00
410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
430F	19.50	22.50	29.50	18.75	24.50
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Motor ...	4.95c	5.70c	5.05c
Dynamo .	5.65c	6.40c	5.75c
Transformer			
72.....	6.15c	6.90c	.....
65.....	7.15c	7.90c	.....
58.....	7.65c	8.40c	.....
52.....	8.45c	9.20c	.....

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. ... 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c
Other Mich. pts. del. ... 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. ... 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box $5.00
Granite City $5.10

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed 4.05c

Long Ternes

Pittsburgh, Gary No. 24 unassorted 3.80c
Pacific Ports 4.55c

Special Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box $4.30
Granite City $4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb....	$12.00	25-lb....	$16.00
15-lb....	14.00	30-lb....	17.25
20-lb....	15.00	40-lb....	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont 2.10c
Gulf ports 2.45c
Pacific Coast ports 2.65c

Steel Floor Plates

Pittsburgh 3.35c
Chicago 3.35c
Gulf ports 3.70c
Pacific Coast ports 4.00c

Structural Shapes

Pittsburgh, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000.....	0.35	3100.....	0.70
2100.....	0.75	3200.....	1.35
2300.....	1.70	3300.....	3.80
2500.....	2.55	3400.....	3.20

4100 .15-25 Mo. 0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni. 1.20
5100 80-1.10 Cr. 0.45
5100 Spr. flats 0.15
6100 Bars 1.20
6100 Spr. flats 0.85
Carb., Van. 0.85
9200 Spr. flats 0.15
9200 Spr. rounds, squares 0.40
T 1300, Mn, mean 1.51-2.00 0.10
Do., carbon under 0.20 max. 0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pitts., Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar ... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails $2.55

(Per Pound)

Polished fence staples .. 2.55c
Annealed fence wire 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C. L. column) .. 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire at Birmingham)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

Rails, Fastenings

(*Gross Tons*)

Standard rails, mill $40.00
Relay rails, Pittsburgh 20—100 lbs. 32.50-35.50
Light rails, billet qual., Pitts., Chicago, Bham. $40.00
Do., rerolling quality.. 39.00

Cents per pound

Angle bars, billet, mills. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.75c
Do., heat treated 5.00c
Car axles forged, Pitts., Chicago, Birmingham.. 3.15c
Tie plates, base 2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅞ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	

Hexagon Cap Screws

Upset 1-in., smaller .....60 off

Square Head Set Screws

Upset, 1-in., smaller ....68 off
Headless, ¼-in., larger ..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅞-inch and under .....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. .....$4.00 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.00
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9.72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Welded Iron, Steel, Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	51
¾	66½	55
1—3	68½	57½

Iron

¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

Steel

2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½

Iron

2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe, Plain Ends

Steel

1 to 3, butt weld..... 68½
2, lap weld 63
2½ to 3, lap weld 66
3½ to 6, lap weld 65
7 and 8, lap weld 64
Seamless, 3 pts. lower discount.

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham .. 48.00-49.00
4-in.. Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in 52.00
Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(*Gross Tons*)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.) $2.00
Do., over ⅝ to $\frac{47}{64}$-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth
3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.. $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 12.00
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.02
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.25c
Do. (1000 lbs. or over) 13.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $30.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	{24.00– 24.50	24.00– 24.50	23.50– 24.50	24.50– 25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	{24.00– 24.50	24.00– 24.50	23.50– 24.50	24.50– 25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.50	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.35
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide. net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00
Do., barge	23.00
No. 2 lump	23.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty paid, sbd. $120.00
Carlots, del. Pitts. 125.33
Carlots, f.o.b. Southern furn. 145.00
For ton lots add $10, for less-than-ton lots $13.50, for less than 200-lb. lots $18.

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00
1½% carbon 128.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 13.00c
Do., ton lots 13.75c
Do., less-ton lots 14.00c
less than 200 lb. lots. 14.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	19.50c	20.25c	20.75c
1% carb.	20.50c	21.25c	21.75c
0.10% carb.	22.50c	23.25c	23.75c
0.20% carb.	21.50c	22.25c	22.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Molybdenum Oxide, lb. Molyb. cont., 5-20-lb. containers, f. o. b., Washington, Pa., and Langeloth, Pa., lb. 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% lb., con. ti., 0.10 C. max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00
15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots. 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 8.25c
Do., ton lots 8.75c
Do., less-ton lots 9.00c
Do., less 200 lbs. 9.25c
Spot ¼c lb. higher

Tungsten Metal Powder, 98-99 per cent, per lb., depending upon quantity $2.60-2.70

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c
Do., spot 85.00c
88% chrome, cont. tons. 79.00c
Do., spot 84.00c

Silicon Metal, 1% iron, contract carlots, 2 x ⅛-in., lb. 14.50c
Do., 2% 13.00c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50
Ton lots 84.50
Less-ton lots, lb. 4.00c
Less 200 lb. lots, lb. 4.25c
Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c
Ton lots 6.00c
Less-ton lots 6.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., ton 108.00
35-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	5.26	3.31	4.06	8.56	7.10
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.85	5.25	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	6.00	....	4.42	....	....
Memphis	4.15	4.35	4.35	4.20	4.20	5.96	4.35	....	6.00	....	4.56	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.79	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	....	5.25	....	7.15	....	....
Seattle	4.00	4.00	5.20	4.75	4.75	6.50	4.75	7.25	6.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	5.45	7.25	4.95	4.95	7.20	5.10	7.30	6.30	....	6.60	11.35	10.35
San Francisco	4.00	5.20	6.80	4.70	4.70	6.40	4.70	7.20	6.45	....	7.05	11.60	10.60

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.45	....	8.75	8.60	9.40
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	6.05	10.60	9.60	9.45	10.10

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300 pounds and over, Portland, Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis; Los Angeles, bars over 4-in. wide, 1-in. thick, 4.95c.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 1 to 10 bun. in Los Angeles; 300 and over in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis ,Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; any quantity in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle, 1 to 99 pounds in Los Angeles; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£ s d
Merchant bars, 3-inch and over	$66.50	16 10 0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20 0 0
Structural shapes	2.95c	15 10 0
Ship plates	2.90c	16 2 6
Boiler plates	3.17c	17 12 6
Sheets, black, 24 gage	4.00c	22 5 0
Sheets, galvanized, corrugated, 24 gage	4.61c	25 12 6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1 10 9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£ s d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6 8 0(a)
Basic pig iron	24.28	6 0 6(a)
Furnace coke, f.o.t. ovens	7.40	1 16 9
Billets, basic soft, 100-ton lots and over	49.37	12 5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14 10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17 12 0††
Shapes	2.77c	15 8 0††
Ship plates	2.91c	16 3 0††
Boiler plates	3.06c	17 0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22 15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26 2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23 15 0
Bands and strips, hot-rolled	3.30c	18 7 0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents. unit, del. E. Pa.

Foundry and basic 56-63%, contract.	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.50-25.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton	.....

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	.....
So. African, 50%	68.00-70.00
Indian, 50%	68.00-70.00
Brazilian, 46%	68.00-70.00
Chilean, 47%	68.00-70.00
Cuban, 50-51%, duty free	.....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

OTHER THAN RAILROAD GRADES (a) (b)	Pittsburgh, *Wheeling *Johnstown, Weirton, Steubenville	Youngstown, *Warren, Canton, Sharon	Chicago	Kokomo, Ind.	Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	Cincinnati Ashland, Ky. Portsmouth, O. Middletown, O.	St. Louis	Detroit	Duluth	Birmingham	Alabama City, Atlanta	*Pacific Coast	Minnequa, Colo.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50	$17.50	$17.85	$18.00	$17.00	$17.00(d)	$14.50	$16.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.50	19.25	19.50	17.50	17.85	18.00	17.00	17.00(d)	14.50	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.50	17.25	17.50	15.50	15.85	16.00	15.00	15.00(d)	12.50	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.75	14.50	14.75	12.75	13.10	.....	12.25	12.25	9.75	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	15.50	15.00	15.00	10.00	12.00
Shovel turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	16.00	15.75	16.00	14.00	14.35	16.50	16.00	16.00	11.00	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	19.00	18.75	19.00	17.00	17.35	17.50	16.50	16.50	14.00	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	13.50	12.50	12.50	10.00	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.25	15.00	†15.25	13.25	13.60	13.75	12.75	12.75	10.25	12.25
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	18.50	16.85	17.00	16.00	16.00	13.50	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00	20.00	20.35	19.00	20.00	.....	18.00	.....
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50	18.50	18.85	17.50	18.50	.....	17.00	.....
Stove plate	19.00	.....	17.00	16.00	18.00	18.50	18.00	18.00	19.00	17.50	17.00	14.10	16.00	17.00	.....	14.00	.....
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.50	24.25	23.50	22.50	22.85	23.00	22.00	.....	19.50	.....
Low phos. bar crops and smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	19.50	.....
Low phos. punch., plate scrap**	23.00(c)	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	17.50	.....
Machinery cast cupola size***	22.00	22.00	21.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00	21.00	21.35	20.00	21.00	.....	19.00	.....
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Punchings and plate scrap‡‡	22.00(c)	22.00	20.75	20.75	20.25	20.75	20.75	21.50	21.25	20.50	19.50	19.85	20.00	19.00	.....	16.50	.....
Punchings and plate scrap§§	21.00(c)	21.00	19.75	19.75	19.25	19.75	19.75	20.50	20.25	19.50	18.50	18.85	19.00	18.00	.....	15.50	.....
Heavy axle and forge turnings	19.50(c)	19.50	18.25	18.25	17.75	18.25	18.25	19.00	18.75	18.00	17.00	17.35	17.50	16.50	.....	14.00	.....
Medium heavy elec. furnace turnings	18.00(c)	18.00	16.75	16.75	16.25	16.75	16.75	17.50	17.25	16.50	15.50	15.85	16.00	15.00	.....	12.50	.....
GRADES ORIGINATING FROM RAILROADS															Kansas City		
No. 1 R.R. heavy melting steel	21.00	21.00	19.75	19.25	.....	19.75	19.75	20.50	20.25	20.50	18.50	18.85	19.00	18.00	17.00	15.50	.....
Scrap rails	22.00	22.00	20.75	20.25	.....	20.75	20.75	21.50	21.25	21.50	19.50	19.85	20.00	19.00	18.00	16.50	.....
††Rerolling quality rails	23.50	23.50	22.25	21.75	.....	22.25	22.25	23.00	22.75	23.00	21.00	21.35	21.50	20.50	19.50	18.00	.....
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	.....	22.75	22.75	23.50	23.25	23.50	21.50	21.85	22.00	21.00	20.00	18.50	.....
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	.....	23.00	23.00	23.75	23.50	23.75	21.75	22.10	22.25	21.25	20.25	18.75	.....
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	.....	23.25	23.25	24.00	23.75	24.00	22.00	22.35	22.50	21.50	20.50	19.00	.....

*Johnstown, Pa., and Warren, O., are not bases for railroad grades; Wheeling railroad only. Eastern Pa. includes Coatesville, Claymont, Conshohocken, Phoenixville and Harrisburg as bases only for "other than railroad grades"; Philadelphia and Wilmington are bases only for railroad grades. Pacific Coast bases are Los Angeles, San Francisco, Seattle, Portland. †Base price at Portsmouth; Middletown 25 cents less and Ashland, Ky; ††The term 'rails for rerolling' includes any rails which are sold to be used for rerolling, irrespective of whether or not such rails are usable for re-laying. **⅜-inch and heavier, cut 12 inches and under; ***may include clean agricultural cast; ‡‡under ⅜-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under. (c) add $1.75 at Pittsburgh. (d) Bases at Atlanta only.

OTHER BASE PRICES: Machine shop turnings $17.60, Alloy, W. Va., $13.35 Toledo, O.; **Shoveling turnings,** $14.35 Toledo; **cast iron borings,** $13.60 Toledo; **No. 1 cupola cast,** $19 Minneapolis and St. Paul, $20.50 Chattanooga, $21 Radford, Va. and $22 Phillipsdale, Bridgeport and Worcester; **Heavy breakable cast,** $20.50 Phillipsdale, Bridgeport and Worcester, $17.50 Minneapolis and St. Paul; **Stove plate** $16 Minneapolis and St. Paul, $17.50 Chattanooga, $18 Radford, Va., $15.60 Toledo and $17.50 Phillipsdale, Bridgeport and Worcester; **Machinery cast cupola size** $21.50 Chattanooga, $22 Radford, Va. and $23 Phillipsdale, Bridgeport and Worcester; **No. 1 machinery cast, drop broken** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester; **Clean auto cast** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester.

(a) The grades specified are, except dealers' No. 1 and No. 2 bundles and uncut structural and plate scrap, as named and defined in the simplified recommendations R-58-36 of the Department of Commerce which shall be the governing specifications for iron and steel scrap hereunder (other than railroad grades). Dealers' No. 1 bundles shall consist of new, clean black sheet scrap, hydraulically compressed in the dealer's yard. Dealers' No. 2 bundles shall consist of old fender and body scrap, and shall in no case command a premium. (b) These grades (other than railroad grades) represent the major classifications of iron and steel scrap. The maximum prices of superior or inferior grades shall continue to bear the same comparable relationship to those major grade classifications as heretofore existed between the prices of such superior or inferior grades and the prices of the major grades.

Maximum price at shipping point: A shipping point is the point from which the scrap is to be shipped to a consumer. Maximum price at which a grade of scrap may be sold f.o.b. its point of shipment is the shipping point of such scrap. **For shipping points located within a basing point,** the shipping point price is determined by taking the basing point price and deducting actual transportation costs to the consumer's plant within the basing point. **For shipping points outside a basing point,** the shipping point price is determined by taking the nearest basing point and subtracting the lowest transportation charge. (Example: No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located.) **Exceptions:** Shipping point of any grade not listed as having a basing point in New England is the Johnstown base minus the all-rail freight from the shipping point to Johnstown. Shipping point prices for New York City, Brooklyn, New York and New Jersey must be computed on the basis of the Bethlehem base although nearer to Buffalo in terms of barge transportation.

Maximum prices to consumers: Maximum price at which any grade (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, not more than 75 cents per gross ton may be included for handling charges at dock. Maximum delivered price in no case shall exceed by $1 a ton the nearest maximum base price in terms of transportation charges. (Example: The $1 excess is the so-called "springboard" arrangement. Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the "springboard" limit of $1 over the Youngstown base of $20.)

Billet and bloom crops originating in the Pittsburgh district may be sold within or without the district at the Pittsburgh base price plus up to, but not more than $2.50 in transportation charges. Maximum prices for **unprepared scrap** shall be $2.50 a ton less than the maximums for corresponding grade or grades of prepared scrap. **Remote scrap** is material located beyond the zone from which the railroad freight rate to Pittsburgh is $11.20 and a consumer may obtain permission from OPACS to absorb transportation charges necessary to obtain 500 tons or more.

Railroad grades: Where a railroad operates in two or more basing points, the highest base applies to consumers anywhere on the line. (Example: New York Central Railroad uses the $21 Pittsburgh base on No. 1 steel since the P. & L. E. operates there). Exception: Switching charges of 84 cents a ton must be subtracted from prices on scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. Where railroad scrap is shipped to an off-the-line consumer, the highest maximum on-the-line price or the nearest basing point price, whichever is higher, applies.

Commissions: Brokers are allowed a commission up to 50 cents a ton above maximum prices to consumers, including export.

Export prices: Maximum on No. 1 heavy melting steel (other than railroad) is the domestic shipping point price plus lowest transportation charge to point of export. Maximum price to a domestic consumer on line of the originating railroad plus transportation to point of export applies on No. 1 railroad steel. Customary differentials apply on other railroad and non-railroad grades.

Sheets, Strip

Sheet & Strip Prices, Page 96

Sheets, while in strong demand, offer better delivery than plates or bars, although a higher proportion of orders takes high priority than a month ago. Occasional deliveries of black sheets with top rating can be obtained in two months, under pressure. Little progress is made in improving shipment on lower priorities. Bookings in general are larger than in September, though mills are not accepting all business offered. Light plate production on sheet mills continues to restrict volume of sheets.

Sheetmakers are paying closer attention to the dates when preferred tonnages will be used, scheduling production to meet the time element. It appears likely that considerable sheet tonnage will not be needed until next year and can be deferred somewhat, making more current tonnage available for lower ratings.

Pennsylvania opens bids Oct. 29 on 1000 tons of sheets for 1943 automobile tags, deliveries to start early next year.

Orders for about 500 tons of carbon spring steel for the Springfield, Mass., armory, for cartridge slips, has been placed by the ordnance department, Newman-Crosby Steel Corp., Pawtucket, R. I., and Thompson Wire Co., Boston, sharing in the contract. For 30,000,000 clips to be produced under subcontracts about 1300 tons of narrow cold-rolled strip is being distributed to several mills.

Heaviest demand in the Cleveland and adjacent districts is for 16 and 18 gage sheets for steel drums, thinner gages being in less demand.

Galvanized Sheet Cost Raised by Zinc Advance

Following advance of zinc prices by 1 cent per pound to stimulate domestic production, manufacturers of galvanized products believe the ceiling on their goods should be advanced to compensate for this increased cost. The industry claims that reduced production due to lack of zinc, higher wages and higher cost of supplies has caused them to operate at a loss for some time and the present advance in zinc fields adds to this condition.

An advance of $2 per ton on galvanized sheets is said to be necessary to offset the rise in zinc and the claim is made that other factors would dictate an increase of at least $8 per ton to bring galvanized sheet production to a profitable basis under present conditions. Galvanized sheet producers are operating at about 50 per cent of capacity, compared with 80 per cent last year and the early part of this year.

Plates

Plate Prices, Page 96

Specifications for steel plates are heavier, with volume this month larger than in all of September. Definite delivery promises are difficult. Theoretically, production schedules are frozen for November, but plates are on an allocation basis and it may be several days before allocations for November are given to mills, which submitted their tentative schedules a week ago. Plate allocations are not on as detailed a basis as in pig iron, applying to consuming groups more than to individuals. Definite delivery promises are impossible until group allocations are issued.

Plate deliveries to several New England shipyards have been slightly lowered, due to heavy accumulations of tonnage, notably in the Portland, Me., district. In some instances plates have been delivered for ships whose keels are not to be laid for several weeks. Except for high ratings, large tank tonnage is inactive, but better than 4000 tons for defense work in other sections is being placed in several contracts awarded by a Boston engineering firm.

PLATE CONTRACTS PLACED

11,000 tons, mostly plates, caissons, dry docks, navy yard, Brooklyn, divided between Bethlehem Steel Co., Bethlehem, Pa., and Chicago Bridge & Iron Co., Chicago.

810 tons, six 100-foot tugs for United States Maritime Commission, to Birch-

field Boiler Works, Tacoma, Wash.

375 tons, tanks for relocation of Southern Pacific Co. tracks, Pitt River division, Calif., to Chicago Bridge & Iron Co., Chicago.

300 tons or more, four 15,000-barrel steel oil storage tanks, Bethlehem Steel Co. plant, Seattle; to Bethlehem Steel Co.

200 tons, 24-inch steel pipe, Metropolitan District Commission, Boston, water division, to Walsh Steam Boiler Works, Holyoke, Mass.

PLATE CONTRACTS PENDING

1200 tons, 58-inch welded or reinforced concrete pipe, Tacoma, Wash.; awarded on concrete basis to American Concrete & Steel Pipe Co., Tacoma, Wash.

162 tons, fifty 5000-gallon underground tanks, navy yard, Mare Island, Calif.; Independent Iron Works, Oakland, Calif., low.

Bars

Bar Prices, Page 97

Shortage in steel bars, both carbon and alloy, is second only to that of plates and while some consumers find the situation slightly easier, the change is small. This is attributed to some accumulation of stocks by consumers and curtailment in automotive demand. In small sizes the situation shows no slackening but rather an increasing shortage.

Bookings in October have been heavier than in September and deliveries against higher priorities are improved in some instances, 60-day shipments against top ratings are made occasionally in carbon and some alloy bars.

Manufacturers of bolts and nuts are buying heavily, stimulated by increasing defense contracts. Some fourth quarter tonnage for warehouses will be pushed over into next year and resellers probably will not receive anywhere near their quotas in fourth quarter, due to increasing volume of top ratings, above the A-9 priority for warehouses.

Wire

Wire Prices, Page 97

Orders for wire and wire products are well in excess of production, which is hampered by restricted supply of wire rods. This results from diversion of steel to other uses, limiting the quantity available for production of rods. Manufacturers' wire is given more freedom than merchant wire and supply is better in that class.

Nails and miscellaneous wire products, such as binders, tie wire and staples are difficult to obtain, the effect being felt in a wide variety of uses. Basket and carton makers, supplying containers for food packing, have difficulty obtaining wire for fastenings and basket supply is restricted.

Nail production is curtailed and shortage is developing, partly a result of heavy use in army cantonments and warehouses, largely of wood construction. Deliveries are six to eight weeks delayed on ordinary nail sizes and as far as 15 weeks on special varieties.

Rails, Cars

Track Material Prices, Page 97

Orders for steel rails for 1942 delivery have started to come in, though railroads are holding down their purchases on account of war conditions. Rail mills have been the source of most shell rounds and any increase in demand for these would limit capacity for rails. Export demand includes a tonnage for Suez and another for Iran, distributed under the lease-lend program, with high priority. Railroads have been asked to accept delivery whenever the mills find opportunity to roll rails and to make their track work conform to conditions at mills.

City of Chicago has placed 4100 tons of rails and accessories for its State street subway.

RAIL ORDERS PLACED

City of Chicago, subway rails, 4100 tons; Carnegie-Illinois Steel Corp., 1692 tons 80 and 100-pound rails; Inland Steel Co., 1300 tons 90 and 144-pound rails; remainder is accessories awarded to several suppliers.

Lehigh & New England, 1940 tons, to Bethlehem Steel Co., Bethlehem, Pa.

CAR ORDERS PLACED

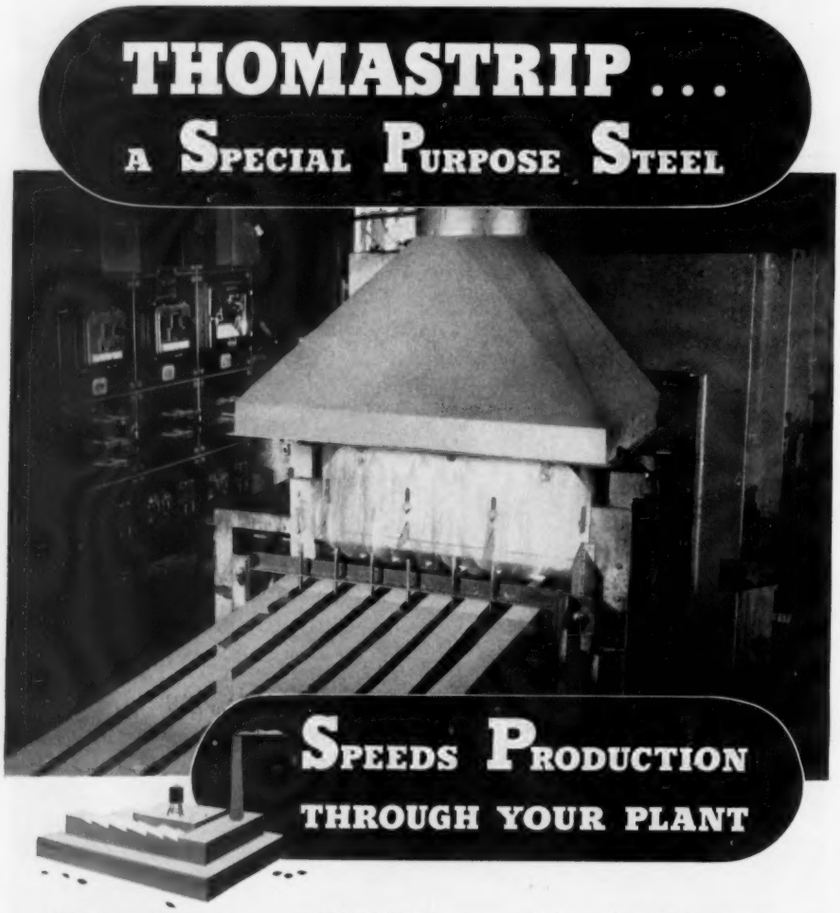
Birmingham Southern, 100 seventy-ton gondolas, 100 fifty-ton box and ten fifty-ton cement hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

CAR ORDERS PENDING

Central Railways of Brazil, 54 passenger coaches, comprising 18 three-car electric trains; reported on inquiry.

LOCOMOTIVES PLACED

Bethlehem Steel Co., one 0-6-0 type steam locomotive, to Vulcan Iron Works, Wilkes-Barre, Pa.



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THE THOMAS STEEL CO. WARREN, OHIO

Specialized Producers of Cold Rolled Strip Steel

Structural Shapes

Structural Shape Prices, Page 97

Restriction of building to actual defense needs has not affected the structural shape market materially, but should ease delivery promises soon. Mills are heavily loaded at present but current buying is only moderate, as projects without high priority cannot be booked with any certainty of delivery. Considerable used material is being utilized in new structures, design being fitted to such steel as can be obtained from wreckers.

SHAPE CONTRACTS PLACED

11,000 tons, steel bearing piles, dry docks, navy yard, Brooklyn, to Carnegie-Illinois Steel Corp., Pittsburgh.

10,000 tons, addition, Douglas Aircraft Co., Santa Monica, Calif., to Bethlehem Steel Co., Los Angeles.

5000 tons, ordnance machine shop, navy yard, Brooklyn, N. Y., to Bethlehem Fabricators Inc., Bethlehem, Pa.; John Lowry Inc., New York, contractor.

3700 tons, addition, Bell Aircraft Co., Niagara Falls, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

3000 tons or more, 35-mile double transmission line, between Bonneville, Oreg., and Vancouver, Wash., to Bethlehem Steel Co., San Francisco, low, $319,277.

2200 tons, State and Dearborn street subway connections, Chicago, to American Bridge Co., Pittsburgh.

1600 tons, piling, dock, Socony Vacuum Oil Co., East Chicago, Ind., to Inland Steel Co., Chicago; Great Lakes Dredge & Dock Co., Chicago, contractor.

1300 tons, boat storage building, naval base, San Diego, Calif., to Bethlehem Steel Co., Los Angeles.

1200 tons, two army hangars, Alaska, to Pacific Car & Foundry Co., Seattle.

750 tons, buildings, for United Airlines Inc., Mills Field, San Francisco, to Bethlehem Steel Co., San Francisco.

560 tons, building, Morgan Packing Co., Austin, Ind., to Central States Bridge Co., Indianapolis.

500 tons, switch structures, specification 1557-D, Grand Coulee dam, Wash., to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, estimated shapes and bars, supplemental contract, Aviation Mechanics' school, Wichita, Tex., to Mosher Steel Co., Dallas, and Ceco Steel Products Corp., Dallas; Robert E. McKee, contractor-engineer, Wichita Falls, Tex.

340 tons, spillway bridge—TVA, Gilbertsville, Ky., to Worden-Allen Co., Milwaukee.

300 tons, Eastern avenue overpass, Middle River, Md., for state, to American Bridge Co., Pittsburgh.

300 tons, boiler house addition, Solvay Process Co., Syracuse, N. Y., to American Bridge Co., Pittsburgh.

298 tons, building extension, Puget Sound Navy yard, Bremerton, Wash., to Midwest Steel & Iron Works Co., Denver.

SHAPE AWARDS COMPARED

	Tons
Week ended Oct. 25	**44,230**
Week ended Oct. 18	**10,231**
Week ended Oct. 11	**23,150**
This week, 1940	**69,875**
Weekly average, 1941	**29,089**
Weekly average, 1940	**21,326**
Weekly average, Sept., 1941	**31,253**
Total to date, 1940	**1,210,866**
Total to date, 1941	**1,250,857**

Includes awards of 100 tons or more.

260 tons, drum gate, Santa Margarita, Calif., for Army, to American Bridge Co., Pittsburgh.

260 tons, highway bridge, Great Bridge, Va., to Phoenix Bridge Co., Phoenixville, Pa.; Carpenter Construction Co., Norfolk, Va., contractor; Hall-Hodges Co., Norfolk, awarded 85 tons reinforcing bars.

220 tons, repairs to bridge No. 1-C, Banksville avenue, Pittsburgh, to American Bridge Co., Pittsburgh.

177 tons, state highway bridge, Cherokee and Crawford counties, Kansas, to St. Joseph Structural Steel Co., St. Joseph, Mo.; Freeto Construction Co., contractor.

170 tons, shop building, Lawrence Engineering Co., Linden, N. J., to Elizabeth Iron Works, Elizabeth, N. J.

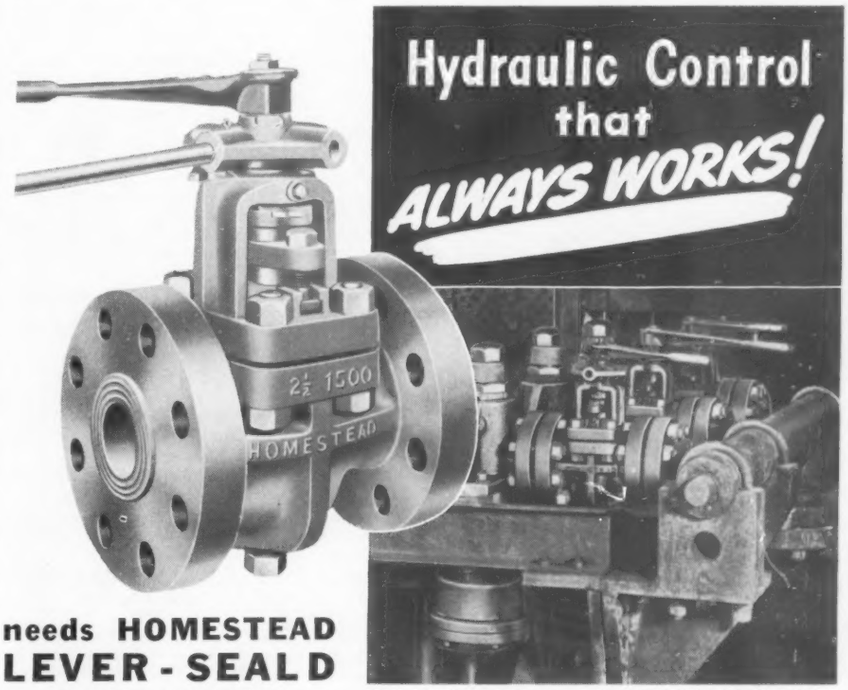
170 tons, storehouse, naval fuel depot, Melville, R. I., to Bethlehem Fabricators Inc., Bethlehem, Pa.; award on delivery basis.

150 tons, buildings, Advanced Single Engine Flying school, Mission, Tex., to Star Hangar Mfg. Co., San Antonio; Hill & Combs Associates, San Antonio, contractor.

150 tons, seaplane nose hangars, delivery Quonset Point, R. I., for export, to Lehigh Structural Steel Co., Allentown, Pa., through George H. Fuller and Merritt, Chapman & Scott, New York, joint contractors.

125 tons, renewal bridge No. 53.47, Coleman's road, Trenton, N. J., for Pennsylvania railroad, to American Bridge Co., Pittsburgh.

Unstated tonnage, state highway project RC-41-35, Suffolk county, New York, to Phoenix Bridge Co., Phoenixville,



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CHICAGO ILLINOIS

Pa.; Andrew Weston Co., Inc., Woodmere, N. Y., contractor; reinforcing bars to Bethlehem Steel Co., Bethlehem, Pa.

SHAPE CONTRACTS PENDING

5000 tons or more, drydock and power plant, Pearl Harbor, T. H., general contract to Pacific Bridge Co., San Francisco.

3600 tons, including 2500 tons for penstocks and 1100 tons for power house, Fort Peck dam, Montana; bids to United States engineer, Kansas City, Mo.; bids Nov. 21.

2800 tons, buildings, Louisville, Ky., for Defense Plant Corp.

1800 tons, turbine shop No. 13, Erie, Pa., for Defense Plant Corp.

1600 tons, electric furnace building, Republic Steel Corp., Canton, O.

1500 tons, aircraft motor test building, Chevrolet division, General Motors Corp., Tonawanda, N. Y.; John W. Cowper Co., Buffalo, low on general contract.

790 tons, trash racks, specif. 1004, Shasta dam, Coram, Calif., for Bureau of Reclamation.

650 tons, assembly shop, Aberdeen, Md.; Lehigh Structural Steel Co., Allentown, Pa., low.

600 tons, trash racks, stop logs and other equipment for Bonneville dam; Bethlehem Steel Co., Seattle, apparently low at $56,290 on one schedule, Pacific Car & Foundry Co., Seattle, on second schedule at $36,981.

570 tons, Frances Cabrini homes, Chicago, for Chicago Housing Authority; S. N. Nielson Co., Chicago, low on general contract; bids Oct. 15.

560 tons, store building, J. C. Penney Co., Cincinnati.

417 tons, bridge over Clark Fork river and Northern Pacific Co. tracks, Mineral county, Mont.; bids opened.

410 tons, state highway bridges LR-148 LR-137, Ephrata, Pa.

385 tons, state bridge, Lancaster county, Pennsylvania; C. W. Good, Lancaster, Pa., low.

340 tons, plant addition, for Continental Roll & Steel Foundry Co., East Chicago, Ind.

337 tons, including 187 tons of sheet piling, 150 tons miscellaneous metal work, also 62 tons of reinforcing, Shore intake, South district filtration plant, Chicago; bids Nov. 5.

280 tons, dumping board, Marginal and East Thirty-Second Streets, New York, for city.

280 tons, two buildings, Rath Packing Co., Waterloo, Iowa; W. A. Klinger Inc., Sioux Falls, Iowa, low on general contract; bids Oct. 9.

240 tons, net storehouse, navy fuel depot, Mellville, R. I.

195 tons, steel bridge caps, unknown location, for Northern Pacific railway.

190 tons, Belt railway subway, West Forty-Seventh street, Chicago, for Cook county, Illinois.

180 tons, bridge over North Shore channel, Lincolnwood, Ill., for Cook county, Illinois.

120 tons, machine building, for Institute of Paper Chemistry, Appleton, Wis.

115 tons, catapult test building, Philadelphia, for Navy.

100 tons, storage building, ammunition depot, Hingham, Mass.

Tin Plate

Tin Plate Prices, Page 96

National tin plate production rate has dropped 2 points to 92 per cent as a result of labor difficulties. Flow of semifinished material from strip mills is improving, augmenting stocks which had declined because of increased use of mill time on plate production.

Army and navy buying is heavy, largely for delivery in 1942. Domestic demand is increasing, canners reporting heavier demand for higher grade products. Miscellaneous users of copper, brass or aluminum containers are turning to tin plate in many instances.

Reinforcing Bars

Reinforcing Bar Prices, Page 97

Pressure for booking of concrete reinforcing bars has eased as users without priority have slackened efforts to place tonnage and are seeking work which carries preferential rating. Defense construction is in large volume and ratings are so high that delivery is much deferred on anything below A-5 in most cases. Most billet bar producers will accept nothing below A-10 though makers of rail steel bars are still booking such orders, though without definite delivery promise.

REINFORCING STEEL AWARDS

1400 tons, Kent avenue sewer, Navy yard, Brooklyn, N. Y., to Jones & Laughlin Steel Corp., Pittsburgh.

900 tons, transformer deck, Coulee dam, to Bethlehem Steel Co., Seattle; Consolidated Builders, Inc., contractors.

900 tons, warehouse No. 13, U. S. Army general depot, Columbus, O., to Jones & Laughlin Steel Corp., Pittsburgh; Corbetta Construction Co., contractor.

780 tons, addition, small arms plant, Des Moines, Iowa, for war department, to Inland Steel Co., Chicago, through Pittsburgh-Des Moines Steel Co., Pittsburgh.

700 tons, Panama canal zone, for war department, to Inland Steel Co., Chicago.

700 tons, superstructure, plant No. 2, Frigidaire Division, General Motors Corp., Moraine, O., to Pollak Steel Co., Cincinnati; Industrial Building Co., contractor.

600 tons, substructure, bridge over Kentucky river, Fayette county, Kentucky, to Laclede Steel Co., St. Louis; Massman Construction Co., contractor.

600 tons, miscellaneous construction, Fort Tilden, Rockaway, N. Y., to Igoe Bros., Newark; Johnson, Drake & Pipe Co., New York, contractor.

600 tons, submarine base, New London, Conn., to Concrete Steel Co., New York, through F. H. McGraw Co., Hartford, Conn., contractor.

600 tons, two buildings, Rath Packing Co., Waterloo, Iowa, to Ceco Steel Products Corp., Des Moines, Iowa; W. A. Klinger Inc., Sioux Falls, Iowa, contractor; bids Oct. 9.

500 tons, harbor defense work, Boston, to Joseph T. Ryerson & Son Inc., Chicago, through U. S. engineer.

500 tons, army fuze and detonator plant,

CONCRETE BARS COMPARED

	Tons
Week ended Oct. 25	14,522
Week ended Oct. 18	11,103
Week ended Oct. 11	7,720
This week, 1940	8,938
Weekly average, 1941	14,628
Weekly average, 1940	8,814
Weekly average, Sept., 1941	34,025
Total to date, 1940	414,710
Total to date, 1941	629,015

Includes awards of 100 tons or more.

Jacksonville, Ark., for war department, to Laclede Steel Co., St. Louis; Ford, Bacon & Davis, contractors.

436 tons, invitation E-2-390, public roads administrator, Republic of Panama, to Jones & Laughlin Steel Corp., Pittsburgh.

400 tons, expansion, New Departure division, General Motors Corp., Bristol, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

360 tons, Pittsburgh Plate Glass Co., Columbia Chemical Division, Barberton, O., to Youngstown Sheet & Tube Co., Youngstown, O.

350 tons, Union Pacific railroad, Ogden, Utah, to Sheffield Steel Corp., Kansas City, Mo., through Gate City Iron Works, Omaha, Nebr.

300 tons, highway project 196, Cincinnati, to Pollak Steel Co., Cincinnati; Visintine Co., contractor.

300 tons, Pepsi-Cola building, Long Island, N. Y., to Republic Steel Corp., Cleveland.

300 tons, 160 tons bars and 140 tons shapes, St. Lucie dam, near Stuart, Fla., to Southern Engineering Co., Charlotte, N. C.; V. F. Loftis Co., Charlotte, contractor.

270 tons, bureau of reclamation, Invitation A-33,399-A-1, Keswick, Calif., to Colorado Builders Supply Co., Denver, Colo.

260 tons, addition, ordnance plant, Weldon Springs, Mo., for government, to Truscon Steel Co., Youngstown, O.; Fraser Brace Engineering Corp., contractor.

250 tons, armament laboratory building, Wright field, Ohio, to Pollak Steel Co., Cincinnati; F. Messer & Son, contractor.

205 tons, Norfolk Navy yard, Req. 453-NSAF, Portsmouth, Va., to Truscon Steel Co., Youngstown, O.

200 tons, Navy yard foundry, Brooklyn, N. Y., to Youngstown Sheet & Tube Co., Youngstown, O.

200 tons, ordnance plant, E. I. du Pont de Nemours & Co., Morgantown, W. Va., to Truscon Steel Co., Youngstown, O.

200 tons, test house, Pratt & Whitney Aircraft Co., East Hartford, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

200 tons, tube mill, Revere Copper & Brass Co., Baltimore, to Bethlehem Steel Co., Bethlehem, Pa.; James Stewart Co., contractor.

200 tons, buildings, advanced Twin Engine Flying school, Lubbock, Tex., to J. B. Klein Iron & Foundry Co., Oklahoma City; C. S. Lambie & Associates, Amarillo, Tex., contractor; 75 tons, structural steel, awarded same fabricator.

180 tons, building, Minneapolis-Honeywell Regulator Co., Minneapolis, to Hustad Co., St. Paul.

150 tons, plant, Isolantite Inc., Belleville, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; John W. Ryan Co., contractor.

140 tons, highway project R-212, Section 12, Bradford county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.; A. B. Cole, contractor.

138 tons, water intake, Hammond, Ind., to Joseph T. Ryerson & Son Inc., Chicago; Nick Santucci, contractor.

135 tons, bars and mesh, state highway project, Branford, Conn., to American Steel & Wire Co., Worcester, Mass.

130 tons, building, Advanced Single Engine Flying school, Mission, Tex., to Ceco Steel Products Corp., Omaha; Hill & Combs Associates, San Antonio, contractors.

125 tons, Illinois ordnance plant, Marion, Ill., for war department, to Joseph T. Ryerson & Son Inc., Chicago; M. J. Boyle & Co., Chicago, contractor.

115 tons, highway project 195, West Salem, O., to Pollak Steel Co., Cincinnati; A. J. Baltes, contractor.

100 tons, Clark Grave Vault Co., Columbus, O., to Joseph T. Ryerson & Son Inc., Chicago; Leo E. Ruisinger, contractor.

100 tons, or more, housing project, Augusta, Me., to Bancroft Martin Rolling Mills Co., Portland, Me., through Stewart & Williams, Augusta, contractors.

REINFORCING STEEL PENDING

2400 tons, twenty-sixth ward sewage plant, Brooklyn, N. Y.

1900 tons, dock walls, Navy yard, Brooklyn, N. Y.

1500 tons, naval air base, Trinidad, B. W. I.

1200 tons, crane track supports, Navy yard, Brooklyn, N. Y.

1000 tons, plant, Jacobs Aircraft Engine Co., Pottstown, Pa.

850 tons, Ft. Winslow 16-inch gun emplacement, Ft. Kiptopeke, Va.

850 tons, Ft. Storey 16-inch gun emplacement, Ft. Kiptopeke, Va.

687 tons, United States Engineer Office, South Pacific Division, San Francisco for Wheeler Field, T. H.; bids Oct. 28.

500 tons, seacoast defense, gun placement, Boston.

400 tons, addition, Boeing Aircraft plant Wichita, Kans.

400 tons, state school buildings, Pennhurst, Pa.

400 tons, plant, Westinghouse Electric & Mfg. Co., Fairmont, W. Va.

350 tons, Ampere, Wash., substation; no tenders received by Bonneville project, Portland, Oreg.

300 tons, switching station, Boston Edison Co., Boston.

300 tons, building 87, packing plant, Morrell & Co., Ottumwa, Iowa; bids Oct. 21 postponed few days.

300 tons, mesh and bars, state highway project, route 28, section 22, Hunterdon

WHY THESE "BLITZ" JOBS LAST LONGER, COST LESS

Among the ARMCO specialty metals that have "enlisted" in Uncle Sam's new blitz army are ARMCO ZINCGRIP sheets and coils. Two of the many new defense applications of this durable metal are pictured here.

ARMCO ZINCGRIP is used for gasoline cans and small fire-fighting equipment because it can "take it" in the field as well as in the shop. Gasoline cans come back for more fillings—even when they get rough treatment during maneuvers. The small fire extinguisher is supplied to the army, as well as to the forestry service. Both cans are easy to transport.

ARMCO Galvanized ZINCGRIP is a good bet for the nation's armed forces even as it is for many peacetime uses. This ductile galvanized metal has remarkable coating adherence. Zinc clings tightly to the base metal, even in severe drawing and forming operations. No flaking, no peeling. Products last longer because there is unbroken zinc protection along the edges.

Now is a good time to learn more about this unique zinc-coated sheet for your future needs. Write today to The American Rolling Mill Company, 3111 Curtis Street, Middletown, Ohio.

ARMCO ZINCGRIP

county, New Jersey; bids Oct. 31, Trenton, N. J.

300 tons, plant construction, Lester, Pa., for Westinghouse Electric & Mfg. Co.; bids asked through United Engineers & Constructors, Philadelphia.

250 tons, service building, armory, Springfield, Mass.

250 tons, plant, Chevrolet Motor Co., Tonawanda, N. Y.

250 tons, three shipways, New York Shipbuilding Corp., Camden, N. J.

250 tons, addition to ordnance plant, Weldon Springs, Mo.

250 tons, United States engineer office, South Pacific Division, San Francisco, for Honolulu; bids opened.

200 tons, plant, Westinghouse Electric & Mfg. Co., Lima, O.

200 tons, building, White Cap Co., Chicago.

180 tons, Winnebago county housing project, Rockford, Ill., new bids Oct. 27; original bids Oct. 6 exceeded estimate.

165 tons, assembly shop, proving ground, Aberdeen, Md.; Bethlehem Steel Co., Bethlehem, Pa., low.

150 tons, dumping platform and ramp, department of sanitation, New York; bids Oct. 27.

140 tons, Stickney Community high school, Oaklawn, Ill.

100 tons, research laboratory, Standard Oil Co. of Indiana, Whiting, Ind.; bids extended from Oct. 20 to Oct. 27.

100 tons, mesh, highway project, route 44, section 12, Salem county, New Jersey; bids Nov. 7, E. Donald Sterner, state highway commisioner, Trenton.

100 tons, sewage treatment plant, Great Lakes Naval Training Station, Great Lakes, Ill.; general contract to Joseph J. Duffy, Chicago; bids Oct. 21.

Scrap

Scrap Prices, Page 100

Scrap shortage continues to interfere with steel production and additional open hearths have been shut down for lack of material. Many plants are operating with practically no reserve, depending on day-to-day receipts. Prices above ceiling are being paid and upgrading is being done, as was the case during August, before the lid was clamped down. OPA is reported to have asked at least two eastern dealers to make adjustments on sales where prices were above ceiling.

Priority orders have not been applied yet and probably will not be until reports have been received and allocations determined. Meanwhile dealers are preparing and shipping all available tonnages on the orders they have on books, awaiting definite orders for shipment under the priority plan. Application to scrap differs radically from other materials as there is no clearly defined point of production, sources being diverse, and priority can be effective only in distribution. Production cannot be apportioned, as is done with pig iron. Direct dealing is likely to be limited under priority, especially in cases where steelmakers put pressure on customers to return scrap produced in fabricating their steel.

In the Pittsburgh district the situation is better than in some other areas and actual interference with production by scrap shortage has been small. Repair work is more of a factor in limiting production. A few temporary shutdowns have occurred from scrap delays but they have not been important. Priority control is expected to equalize stocks by restricting shipments to melters having larger backlogs and diverting them to those with small supply. Reserves at steel mills are uneven, varying from requirements for a few days to several months.

Pig Iron

Pig Iron Prices, Page 98

Better balance in pig iron inventory is being achieved under OPM allocation and November schedules show a number of instances where melters will receive larger tonnages than for the past two months. Numerous consumers will receive allotments for the first time under the new plan, having reduced inventory sufficiently to meet requirements. Some requisitions have been reduced from the tonnage asked, in the interest of equitable distribution.

An increasing volume of defense work is being booked by melters. The Navy recently received bids on only about 1000 tons of a 5000-ton inquiry for various yards. The 4000 tons on which no bids were filed were for the yard at Portsmouth, Va.

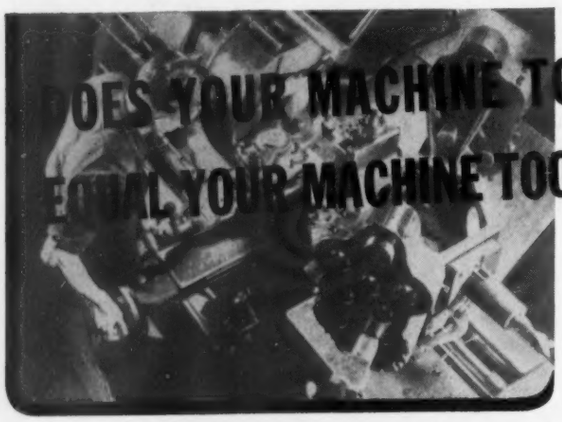
Inventory and the priority situation have become prime factors in the OPM schedule and are being applied to monthly allocations to obtain widest possible distribution to users engaged on defense work while limiting accumulation of iron beyond current needs.

The new stack of the Hanna Furnace Co. at Detroit is expected to blow in about Dec. 1 and the Toledo Furnace Co.'s stack at Toledo, O., out for relining, will resume soon. These two stacks will add about 40,000 tons monthly to available supply.

Pacific Coast

San Francisco—Demand for structural shapes continues exceptionally heavy and awards aggregated 18,928 tons, bringing the total for the year to 547,752 tons, compared with 302,718 tons for the corresponding period in 1941. Important tonnages included 10,000 tons for an addition to Douglas Aircraft Co., Santa Monica, Calif.; 2000 tons for a plant in Los Angeles for Phelps-Dodge Corp.; 1300 tons for a boat storage building at the naval base, San Diego, Calif.; 1200 tons for two army hangars in Alaska. Pacific Bridge Co. secured the contract for a drydock and power plant at Pearl Harbor, T. H., which will require 5000 tons or more, although specifications have not yet been completed.

Shipyards continue to call for heavy tonnages of plates which are being allocated to various mills. Birchfield Boiler Works, Tacoma,



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HOTEL CLEVELAND *Cleveland*

Wash., was awarded six 100-foot tugs for the United States maritime commission, involving 810 tons, in addition to 30 tons of shapes.

Pacific Coast rolling mills are booked weeks in advance on priorities for defense work and reinforcing bar jobbers find it difficult to obtain reinforcing bars for private work. Awards totaled 2177 tons and brought the aggregate to date to 148,505 tons, compared with 139,447 tons for the same period last year.

Seattle—Plates and sheets are reported exceptionally scarce and projects involving these materials which do not rate A-1 priority are being delayed. Other steel items reflect the same general condition.

Rolling mills are not quoting on new inquiries and are making every effort to reduce backlogs, which have assumed record proportions. Indicative of this is the report that the Bonneville project this week received no bids for furnishing 350 tons of reinforcing bars for Ampere substation. Many new defense projects, requiring large tonnages of reinforcing bars, are developing in this area but cannot be released yet.

Bethlehem Steel Co. plans erection of four 15,000-barrel steel oil storage tanks at Seattle. Northwest Steel Rolling Mills, Seattle, was down this week to make necessary replacements and repairs, and will reopen with a double shift.

While local steel mills are not suffering from lack of scrap, receipts are less than desired. The area tributary to Coast plants has been reduced as Montana is now shipping to the East and local mills have to obtain supplies from Washington state and Idaho. Materials are accumulating in Oregon where freights are adverse but if the situation becomes acute it is expected regulations will be adjusted to absorb Oregon materials.

Canada

Toronto, Ont.—The Canadian government has removed the duty of $8 per ton on steel plate for use in manufacture of disc wheels for army-type motor vehicles. Demand for all types of steel is gaining, with producers holding strictly to priority ratings. Production of civilian goods is continually being pushed into the background and non-war contractors have difficulty in obtaining raw materials. One large foundry, normally employing some 400 men, has been forced to cut its staff in half and is uncertain what further reductions may be necessary.

Inquiries continue heavy for merchant bars, but bookings by mills are slow, due to record backlogs and priority regulations. Small users state it is practically impossible to obtain new supplies.

Structural steel lettings dropped sharply last week, with awards running under 5000 tons. Prospective business, however, continues good.

Interest continues high in iron and steel scrap. The Canadian steel controller has announced new basing points for cast scrap, with maxi-

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mum selling prices. Under the new classification basing points have been established at Toronto, Windsor, Walkerville, and Fort William in Ontario and Montreal in Quebec. Current maximum prices are as follows in gross tons, delivered consumer's plant:

	Montreal, Toronto, Windsor, Walkerville	Fort William
No. 1 machinery cast	$23.00	$18.00
No. 2 machinery cast	22.00	17.00
Automobile cast	22.00	17.00
Plow points, chilled cast iron and white iron	21.00	16.00
Stove plate	19.00	14.00

For scrap purchased at any point in Canada other than a basing point, for consumption in Ontario or Quebec, the maximum prices shall be those set forth above, less the amount of regular freight charges for shipment. Hamilton, Ont., however, comes under special classification with prices per gross ton as follows: No. 1 machinery cast, $21.75; No. 2 machinery cast, $20.75; automobile cast, $20.75; plow points, chilled cast iron and white iron, $19.76; stove plate, $17.75.

Iron Ore

Iron Ore Prices, Page 99

September consumption of Lake Superior iron ore totaled 6,447,539 gross tons, slightly less than the high record of 6,534,424 tons in August, but well above 5,671,918 tons used in September, 1940, according to the Lake Superior Iron Ore Association. Consumption to Oct. 1, this year totaled 56,160,488 tons, compared with 44,228,922 tons in the comparable period in 1940.

Ore at furnaces and on Lake Erie docks Oct. 1 totaled 40,770,029 tons, compared with 36,468,769 Sept. 1, and 37,090,053 tons a year ago. Of this total 36,106,400 tons were at furnaces and 4,663,629 tons on Lake Erie docks.

Steel in Europe

Foreign Steel Prices, Page 99

London — (*By Cable*) — Little change has taken place in the steel and iron situation in Great Britain. Demand continues heavy for shipbuilding, tanks, boilers, railroad maintenance and coal mining supplies. Sheets and wire are in good demand. Steelmaking pig iron supplies are satisfactory and semifinished stocks are plentiful. Good deliveries are being made on war contracts, owing to widespread restrictions on civilian and export orders.

A.C. Denison Heads Gray Iron Founders

■ Gray Iron Founders Society held its annual meeting at Hotel Cleveland, Cleveland, Oct. 21, with 75 attending. F. G. Steinebach, editor of *The Foundry* magazine addressed the group following luncheon.

Discussion centered around defense work. W. W. Rose, executive vice president of the society, gave a detailed report of activities in Washington in connection with the new branch office of the society.

Officers elected were: President, A. C. Denison, president, Fulton Foundry & Machine Co., Cleveland; vice president, R. D. Phelps, president, Francis & Nygren Foundry Co., Chicago; secretary, George Walton, vice president, Madison Foundry Co., Cleveland; treasurer, S. C. Mefford, treasurer, Auburn Foundry Inc., Auburn, Ind.

The following were elected to fill the vacancies on the board: R. O. Collins, R. O. Collins Iron Works, Tallahassee, Fla.; J. D. Crain, Vulcan Foundry Co., Oakland, Calif.; George Walton, Madison Foundry Co., Cleveland; Franklin Farrel III, Farrel-Birmingham Co., Ansonia, Conn.; A. B. Root Jr., Hunt-Spiller Mfg. Corp., Boston. R. J. Redmond, Buckeye Foundry Co., was re-elected.

Metal Institute Re-elects Officers

■ All officers of the Metal Treating Institute were re-elected at a meeting in Benjamin Franklin hotel, Philadelphia, Oct. 19. They are Charles I. Wesley, president of Wesley Steel Treating Co., Milwaukee, president; N. M. Salkover, vice president of Queen City Steel Treating Co., Cincinnati, vice president; and Arthur H. Neusse, secretary of Wesley Steel Treating Co., secretary-treasurer.

New directors were elected as follows: Raymond G. Sault, Porter Forge & Furnace Inc., Everett, Mass.; W. W. Farras, Cook Heat Treating Co., Los Angeles; Horace C. Knerr, Metlab Co., Philadelphia; W. S. Hamilton, Accurate Steel Treating Co., Chicago; and L. A. Lindberg, Lindberg Steel Treating Co., Chicago.

Zinc Dust Base Price Increased 0.85 Cent

■ Upward adjustment in the price of zinc dust, important in mining and in the production of various chemicals, paints, and dyes, to reflect recent increases in prices of primary zinc and zinc dross has been approved by OPA.

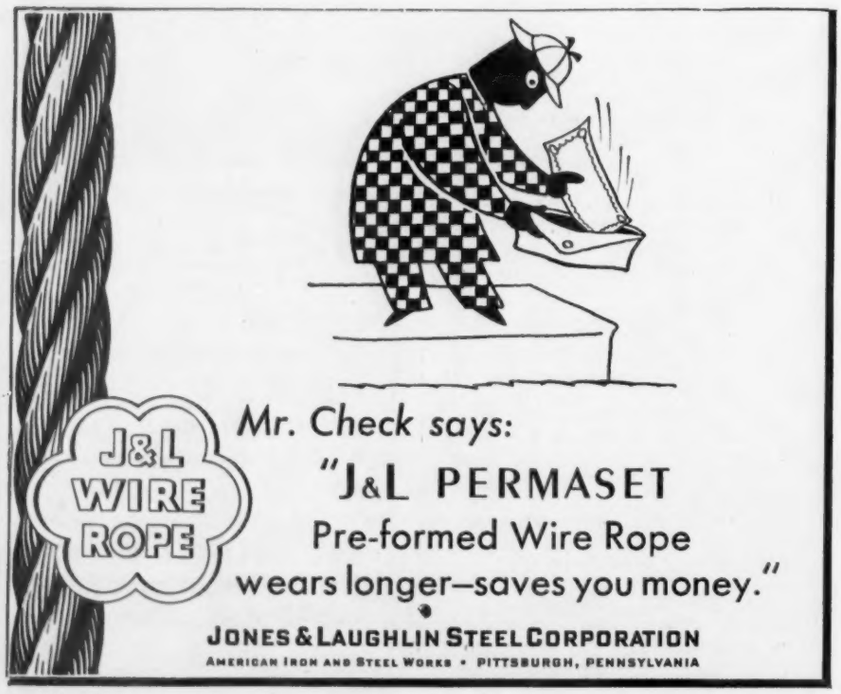
Previously, producers of zinc dust, at the request of OPA, maintained a base price of 9.5 cents a pound, delivered in carload lots, drums returned. The new base price approved by OPA is 10.35 cents per pound. For less than carload shipments the new price is 11.35 cents a pound, f.o.b. shipping point, drums not returned.

Lead Refiners To Set Aside 15 Per Cent for Pool

■ Refiners of lead have been ordered to set aside 15 per cent of their November production for allocation by the Director of Priorities, in a supplementary order to General Preference Order M-38.

It is estimated the order will set aside from 6000 to 6500 tons of lead for allocation, in addition to the amounts allocated out of Metals Reserve Co. supplies.

Metal not allocated out of the priorities pool for sudden defense uses during the month will be added to the government stockpile of lead.



August Steel Exports 29 Per Cent Over July

■ Exports of steel and iron products, excluding scrap, increased in August, totaling 617,477 gross tons, valued at $44,375,965, a gain of 29 per cent over July exports of 478,016 tons, valued at $34,855,419, according to the Department of Commerce. In August, 1940, the comparable figure was 1,048,816 tons, valued at $53,870,693.

Cumulative exports for eight months this year were 4,112,161 tons, valued at $302,433,664, in contrast to 4,521,568 tons, valued at $291,210,789, in the period in 1940.

The most important item, in tonnage, exported in July was nonalloy ingots and blooms, totaling 217,563 tons, or 88 per cent over 115,778 tons in July. Pig iron was second, 64,925 tons against 63,057 tons in July. Tin plate and taggers' tin was third with 32,588 tons.

Steel and iron scrap exports amounted to 80,255 tons, valued at $1,564,209 in August, 34 per cent over July exports of 59,905 tons, valued at $1,160,533, but less than the 355,991 tons, valued at $6,078,241, exported in August, 1940.

Scrap exports for eight months this year were 556,040 tons, valued at $10,836,093, compared with 2,161,926 tons, valued at $36,629,435 in the period in 1940.

Nonferrous Metals

New York — An order virtually prohibiting use of copper for a substantial majority of civilian products was issued by OPM last week, while another one was issued requiring lead producers to contribute 15 per cent of their November production to a pool for subsequent OPM allocation.

Copper — In curtailing consumption of copper for specific purposes, OPM stated that military needs alone exceeded total supplies by 6000 tons during October. The 1942 shortage was estimated at 750,000 tons.

Lead—Between 6000 and 6500 tons of lead are expected to be placed in the OPM pool next month for allocation by OPM to defense consumers. Balance of November production, or about 37,000 tons will be distributed by the producers themselves in the usual manner. One producer may step up production from a five-day to a six-day week, thereby increasing his production about 15 per cent. This and other increases in production depend on an increase in lead prices.

Tin—An increase in the war risk insurance rate on shipments of tin from the Far East has counteracted a slight decline in the Singapore market, leaving the equivalent price of tin bought in the Far East at about 52.25c, New York.

Nonferrous Metal Prices

Oct.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-8	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	7.25	15.00	14.00	35.00
9-24	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	12.50-13.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.00-10.25
Cleveland	10.50-10.75
Chicago	10.25-10.50
St. Louis	10.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00-10.50
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.25-9.50

Light Copper

New York	8.00
Cleveland	8.00-8.50
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.00-6.25
Chicago	6.00-6.25
St. Louis	6.25

Lead

New York	5.25
Cleveland	5.00-5.25
Chicago	4.75-5.00
St. Louis	4.75-5.00

Old Zinc

New York	4.50
Cleveland	4.00-4.12½
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

Canadian War Orders

(Concluded from Page 46)

Ottawa, Ont., $5170; General Supply Co. Ltd., Ottawa, $25,260; Northern Electric Co. Ltd., Ottawa, $49,262; Crouse-Hinds Co. of Canada Ltd., Toronto, $6339; Rogers Majestic Ltd., Toronto, $8120; Willard Storage Batteries Ltd., Toronto, $5271.

Machinery: T. E. Ryder Machinery Co. Ltd., Montreal, Que., $8379; Reavell & Co., Montreal, $10,891; Federal Equipment Co., Chatham, Ont., $9590.

Tools: Union Twist Drill Co. Ltd., Rock Island, Que., $10,266; Canadian Trade Corp., Montreal, $25,982; Canadian Fairbanks-Morse Co. Ltd., Ottawa, Ont., $8460.

Fire fighting equipment: Walter Kidde & Co. Ltd., Montreal, $43,589; C.-O.-Two

Fire Equipment of Canada Ltd., Toronto, $43,589; LaFrance Fire Engine & Foamite Ltd., Toronto, $140,519; Pyrene Mfg. Co. Ltd., Toronto, $7646.

Ordnance: Dominion Engineering Works Ltd., Montreal, $1,576,800; Gauthier & Julien, Quebec, Que., $19,400; John Hay & Co., Eastview, Ont., $18,870; William & J. G. Greey, Ltd., Toronto, $5600.

Munitions: Overseas Requisition, London, England, $561,690; International Flare Signal Co. Ltd., Waterloo, Que., $30,304; Dominion Arsenals, Ottawa, $56,484; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, $51,488; Goderich Organ Co., Goderich, $6401; Canadian Wirebound Boxes Ltd., Toronto, $5494; Kraft Containers Ltd., Hamilton, $5744.

War construction projects: Stewart Construction Co., Sherbrooke, Que., $490,000; Storms Contracting Co. Ltd., Toronto, $190,000.

Chemicals: Allied War Supplies Ltd., Montreal, Que., $41,000.

Miscellaneous: General Steel Wares Ltd., Ottawa, Ont., $55,250; Dominion Rubber Co. Ltd., Ottawa, $17,822; Duplate Safety Glass Co. Ltd., Ottawa, $40,825; Peterborough Lock Co. Ltd., Peterborough, $24,618; Western Rubber Co. Ltd., Alton, $9000; E. A. Walsh Co. Ltd., Hamilton, $5265; Way Sagless Spring Co. Ltd., Toronto, $13,620; Viceroy Mfg. Co. of Canada Ltd., Toronto, $5330; Reg. H Steen Ltd., Toronto, $87,000; McLaughlin Bros., Ottawa, $6000; Canadian Industries Ltd., Montreal, $106,914; Steel Co. of Canada Ltd., Montreal, $5206; N.B. Wire Fence Co. Ltd., Moncton, N. B., $6485; Power Bros. Ltd., Lunenburg, N.S., $7000; Henry Berger & Son Ltd., Winnipeg, Man., $59,000; Nelson River Construction Co. Ltd., Winnipeg, $54,000; Doncaster Construction Co., Edmonton, Alta., $16,000.

Metallurgical Coke

Coke Prices, Page 97

Strike against captive coal mines, ordered for Oct. 27, ending the 30-day truce following the walkout of September, threatens coke supply to steelmaking companies drawing their coal supply from these mines. National defense mediation board, which has had union demands under consideration, promises a recommendation at once, which may shorten the interruption.

Heavy demand for coal has prevented accumulation of stocks recently and it is estimated coke ovens have supply for about 30 days. Unless oven workers become involved in the strike no immediate interference with blast furnace operation will result.

Construction and Enterprise

Ohio

AKRON, O.—United States Steel & Concrete Railroad Cross-Tie Co., J. L. Cox, 709 Akron Savings & Loan building, attorney, recently incorporated, is producing sample ties for test use and in November will make plans for starting production.

ALLIANCE, O.—Kulka Iron & Metal Co., 8000 Webb street, is building a metal storage building costing $10,000.

CANTON, O.—Timken Roller Bearing Co., 1835 Dueber avenue S.W., has let contract for a boiler house to Gibbons-Grabble Co., Mellett building, to cost about $100,000.

CLEVELAND — Cleveland Automatic Machine Co., 2269 Ashland road, is seeking government approval of $78,000 addition to its assembly space and machine shop. C. B. Rowley & Associates, Keith building, architects, are preparing plans.

CLEVELAND—Grasselli Chemical division of E. I. du Pont de Nemours & Co., 2615 Independence avenue, is building three-story brick boilerhouse addition, to cost about $50,000.

CLEVELAND—Arro Tool Co., 2401 Meyer avenue, Harry G. Barth in charge, will build new plant covering 2000 square feet at West 129th street and Triskett avenue, Lakewood, O.

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 104 and Reinforcing Bars Pending on page 105 in this issue.

Connecticut

MIDDLETOWN, CONN.—City, S. G. Cannon, superintendent of public works, plans construction of a sewage disposal plant to cost about $30,000.

NEW BRITAIN, CONN.—New Britain Machine Co., 140 Chestnut street, has let contract for a one-story 100 x 140-foot plant to Hasson & Downes, New Britain, to cost $53,400. M. L. Baldesari, Stanley street, is engineer.

NEW HAVEN, CONN.—Wire Rope of America Inc., 464 Congress avenue, will build a one-story 112 x 150-foot manufacturing unit and storage space, to cost about $46,000. L. Caproni, 1221 Chapel street, is engineer.

WATERBURY, CONN. — American Brass Co., Main street, has let contract for one-story 75 x 110-foot plant addition to Torrington Building Co., 187 Church street, Torrington, Conn., to cost about $40,000. (Noted Sept. 29.)

WATERBURY, CONN. — Board of trustees of Waterbury hospital, Robbins street, has plans by Coolidge, Shipley, Bulfinch & Abbott, 1 Court street, Boston, for a power plant and laundry unit, to cost about $175,000.

WATERTOWN, CONN. — Watertown Mfg. Co., Echo Lake road, has let contract for two-story resin manufacturing plant to Robert L. Vaill & Co., 56 Echo Lake road, at cost of about $40,000. (Noted Oct. 6.)

Massachusetts

FITCHBURG, MASS.—Fitchburg Gas & Electric Co., 655 Main street, has let contract to Wiley & Foss, Central street, for a one-story 48 x 50-foot boiler plant addition to cost about $50,000. (Noted Oct. 6.)

LYNN, MASS.—General Electric Co., 920 Western avenue, has let contract for a one-story 80 x 85-foot forge shop addition to L. R. Porter Co., 126 Park street, Beverly, Mass., to cost about $40,000, with equipment.

WEST BOYLSTON, MASS.—Shell Oil Co. Inc., 49 West Forty-ninth street, New York, will award contract soon for oil terminal bulk plant here, costing $50,000. G. M. Ramsey, 50 West Fiftieth street, New York, is engineer.

WORCESTER, MASS. — Crompton & Knowles Loom Works, 93 Grand street, will build a one-story 65 x 125-foot forge unit addition and make plant alterations, to cost about $40,000. Contract has been let to E. Whitehead Inc., Union street.

WORCESTER, MASS.—H. Green, commissioner of public works, city hall, has an appropriation of $45,000 for waterworks extensions and pumping facilities.

New Hampshire

PLYMOUTH, N. H.—REA has allotted $190,000 to New Hampshire Electric Cooperative for 181 miles of rural transmission lines to serve 428 customers.

Vermont

LYNDONVILLE, VT.—Vermont Tap & Die Co. will build a two-story 50 x 160-foot factory, contract to Harty-Blaney Construction Co., 25 Huntington avenue,

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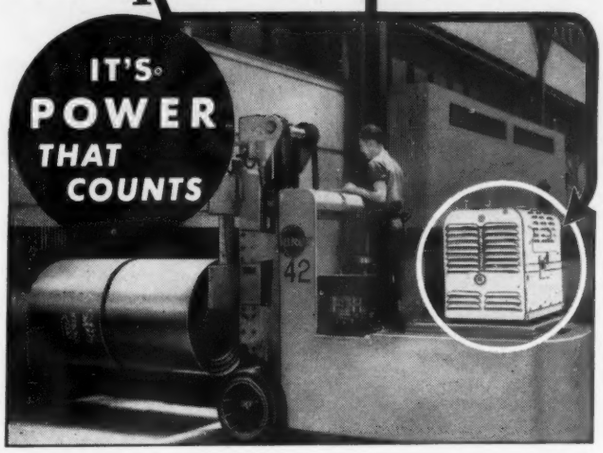

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Less than half time required to obtain above results, as compared with any other method—*guaranteed.*

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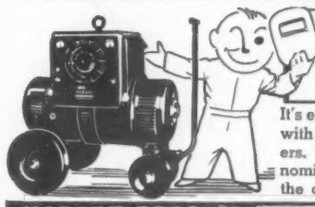

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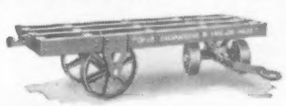

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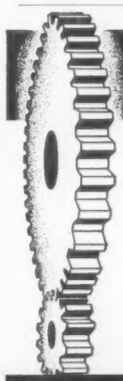

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Boston, at about $60,000.

New York

ALBANY, N. Y.—Magnus Metal Co., Colonie, N. Y., a suburb, has let contract to the Austin Co., 19 Rector street, New York, for a boilerhouse, oil storage building and service building, costing about $40,000.

BROOKLYN, N. Y.—Robins Dry Dock & Repair Co., 1-75 Beard street, has plans by Kelly, Sykes & Hennessey, 144 East Thirty-ninth street, New York, for a two-story 45 x 113-foot compressor house and transformer station at 2-46 Halleck street, to cost about $40,000. (Noted July 28.)

FREEPORT, N. Y.—Columbian Bronze Corp., 216 North Main street, has let contract to the Austin Co., 19 Rector street, New York, for a bronze casting plant costing about $60,000.

SYRACUSE, N. Y.—Solvay Process Co., Milton avenue, will build a phenol manufacturing plant costing about $500,000.

New Jersey

HANOVER, N. J.—Maltbie Chemical Corp., 240 High street, Newark, N. J., has let contract for laboratory and manufacturing building to Sturgis Bros., 22 Garden street, Morristown, N. J. (Noted Sept. 1.)

UNIONVILLE, N. J.—Elastic Stop Nut Corp., 2330 Vauxhall road, has let contract to the Austin Co., 19 Rector street, New York, for a one-story 140 x 250 and 40 x 260-foot addition costing about $150,000.

Pennsylvania

KITTANNING, PA.—Linde Air Products Co., 30 East Forty-second street, New York, has let contract for manufacturing plant here to James Stewart & Co., 220 Park avenue, New York. Estimated cost is $1,500,000.

POTTSTOWN, PA.—Jacobs Aircraft Engine Co. has a lease agreement with Defense Plant Corp. for a new plant near its present factory at cost of $13,000,000 for manufacture, under license, of Pratt & Whitney aircraft engines for the war department. Equipment will represent $8,000,000 of the cost.

Michigan

HAMTRAMCK, MICH.—Detroit Bevel Gear Co., 8130 Joseph Campau avenue, has plans by Shreve, Anderson & Walker, 914 Marquette building, for a one-story plant addition costing about $50,000.

Illinois

BETHALTO, ILL.—Village has been allotted $178,000 by the federal government for construction of waterworks and a sewer improvement program to cost about $303,000. Village will contribute $125,000 through certificates to be liquidated from rentals.

MATTOON, ILL.—REA has allotted $252,000 to Colese-Moultrie Electric Cooperative, John G. Waggoner, superintendent, for 247 miles of rural transmission lines to serve 703 customers.

PARIS, ILL.—Edgar Electric Co-operative Association, W. L. Walker, superintendent, will build 291 miles of rural electric lines, allottment given by REA. Stanley Engineering Co., Muscatine, Iowa, is engineer.

ROCKFORD, ILL.—Barnes Drill Co., machine tool manufacturer, will build a three-story 77 x 81-foot addition costing $25,000 to its plant at 814 Chestnut street, for machine shop and storage.

STEELVILLE, ILL.—Egyptian Electric Co-operative, Theodore F. Fieker, superintendent, has given contract to Donovan Construction Co., St. Paul, Minn., for 369 miles of rural transmission lines to serve 661 customers. Stanley Engineering Co., Muscatine, Iowa, is engineer.

Indiana

EAST CHICAGO, IND. — American Steel Foundries has a lease agreement with Defense Plant Corp. for construction and equipment of a plant costing $9,413,901 for manufacture of tank equipment.

Maryland

BALTIMORE — American Hammered Piston Ring division of Koppers Co. will open bids Oct. 28 for alterations and additions to plant at Bush and Hamburg streets, at cost of about $200,000. Robert N. Gibson is company engineer. (Noted Sept. 22.)

SHENANGO-PENN

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•

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(Rail and River Shipments)

BALTIMORE—Koppers Co., Bartlett Hayward division, has been granted allotment of $142,535 for equipment to manufacture naval equipment. Previous contract granted $1,250,000 for aircraft engine parts plant.

HAGERSTOWN, MD.—Fairchild Engine & Airplane Corp. has let contract to Price Construction Co., Maryland Trust building, for additional plant facilities to cost $1,675,967. Albert Kahn Inc., 345 New Center building, Detroit, is engineer.

District of Columbia

WASHINGTON—Trans-American Pipeline Corp., Lincoln National Bank building, plans 12-inch pipe line from Wichita Falls, Texas, to Savannah, Ga., 1050 miles, to cost $20,535,390, to carry crude and fuel oil. Includes six 1200-horsepower and 20 2400-horsepower pumping stations. E. Stanley Glines is president. Vincent G. Shinkle, 245 West 107th street, New York, is consulting engineer.

North Carolina

MARSHALL, N. C.—REA has allotted $235,000 to French Broad Electric Corp., Mark W. Bennett, superintendent, for 224 miles of rural transmission lines to serve 1092 customers.

Tennessee

COPPERHILL, TENN.—Tennessee Copper Co., 61 Broadway, N. Y., has contract from war department to design construct and operate an oleum plant for East Tennessee ordnance works. Leonard Construction Co., 37 South Wabash avenue, Chicago, is general contractor. Construction will cost about $2,038,844 and equipment $1,302,000.

MANCHESTER, TENN.—City, T. A. Johnson, mayor, will take bids soon for waterworks and sewers to cost $370,000. Walter L. Picton, American National Bank building, Nashville, Tenn., is engineer.

MEMPHIS, TENN.—Layne & Bowler Inc., manufacturer of specialties for water supply plants, is building an addition covering 8800 square feet for enlarged production of steel pipe and well screens, increasing production 25 per cent. Company has much defense work.

MILAN, TENN.—Government has approved construction of waterworks facilities costing $176,000, including elevated steel tank, water treatment plant and extensions.

WINCHESTER, TENN.—City seeks federal funds for construction of refuse incinerator costing $30,000. W. L. Picton, 711 American Bank building, Nashville, Tenn., is engineer.

Louisiana

LAKE CHARLES, LA.—Mathieson Alkali Works Inc., 60 East Forty-second street, New York, has awarded contract for a magnesium plant here, with capacity of 36,000,000 pounds annually, to M. W. Kellogg Co., 225 Broadway, New York. Will be financed by Defense Plant Corp. Cost estimated at $16,000,000. (Noted Sept. 1.)

Oklahoma

CHOTEAU, OKLA.—War department, Washington, has awarded contract for Oklahoma Ordnance Works to E. I. du Pont de Nemours & Co., Du Pont building, Wilmington, Del. Construction estimated to cost $45,982,478 and equipment $14,023,800.

CLAREMORE, OKLA.—Cardox Corp., 307 North Michigan avenue, Chicago, will build potassium perchlorate plant here at cost of $250,000.

WALTERS, OKLA.—Cotton Electric Co-

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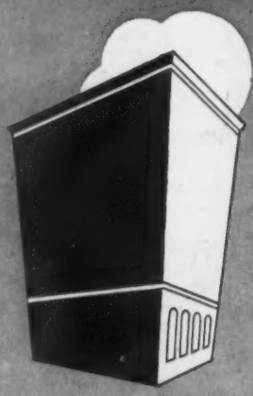
operative, C. W. Cox, superintendent, has been given $120,000 REA allottment for 260 miles of rural transmission lines to serve 1111 customers.

Wisconsin

OXFORD, WIS.—Village, R. U. Mitchell, clerk, has applied to WPA for funds for waterworks supply system to cost about $40,000. General Engineering Co., Portage, Wis., is engineer.

Minnesota

MINNEAPOLIS — Minneapolis-Honeywell Regulator Co. is building a plant addition costing $350,000, to be completed Feb. 1. Will be used for manufacture of sights for the navy. Navy department will own the plant. C. F. Haglin & Sons Inc., Minneapolis, is contractor.



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Texas

GARLAND, TEX.—Defense Plant Corp., Washington, is considering bids for plant 300 x 400 feet for manufacture of diesel engines for tanks, to cost $750,000. J. Gordon Turnbull, Dallas, Tex., is engineer and architect.

Kansas

JUNCTION CITY, KANS.—City, Elic Trosper, mayor, has received $20,000 federal funds to assist in financing municipal waterworks system estimated to cost about $75,000. C. M. Schmitley is resident engineer.

North Dakota

ROLLA, N. DAK.—City, Vic Jackson, auditor, is having plans made for a sewage disposal plant, including Imhoff tank. Will apply for WPA funds.

South Dakota

EDGEMONT, S. DAK.—Mountain States Power Co. is making survey in this locality for electric power facilities. L. W. Edward, Casper, Wyo., is consulting engineer.

STURGIS, S. DAK.—City, M. J. Kerper, auditor, is seeking federal funds to aid financing enlargement of its sewage disposal plant at estimated cost of $45,000.

Iowa

BURLINGTON, IOWA—Karl M. Pfeiff, county auditor, takes bids to Nov. 6 on steel water tower. Keffer & Sons, 202 Masonic temple, Des Moines, Iowa, are architects.

DAVENPORT, IOWA—Ralph C. Graham, superintendent of construction, has recommended construction of sewage pumping station to solve sewage problems resulting from large residence construction.

EARLVILLE, IOWA—City James Bramley, mayor, is having survey made for sewage disposal plant by Currie Engineering Co., Webster City, Iowa. State board of health has recommended construction.

EARLVILLE, IOWA—City, Elmer J. Primus, clerk, has retained Currie Engineering Co., Webster City, Iowa, to make survey for sewer system and sewage disposal plant to cost about $30,000.

PAULLINA, IOWA—City, G. W. Harris, clerk, will take bids until Nov. 10 for power plant additions and equipment. Buell & Winter, 508 Insurance Exchange building, Sioux City, Iowa, are consulting engineers. (Noted April 21.)

RENWICK, IOWA—City, Fritz Britt, clerk, has completed plans and will take bids about Nov. 8 on power plant extension estimated to cost $30,000. Ralph W. Gearhart, Cedar Rapids, Iowa, is consulting engineer.

VINTON, IOWA—City, F. J. Lynch, clerk, takes bids to Nov. 4 for improvements to municipal light and power plant, including motor changeover and additions to distribution system. Stanley Engineering Co., Muscatine, Iowa, is engineer.

Utah

LEHI, UTAH—Kalunite Co. is having plans made for first unit of a plant to produce alumina, basic material for aluminum production. Defense Plant Corp. will finance project.

California

FRESNO, CALIF.—Levi Pipe & Supply Co., 648 Broadway, is having plans prepared for a plant addition to cost about $40,000.

LONG BEACH, CALIF.—South Coast Machine Works has been incorporated with $25,000 capital by D. H. Thompson and associates. Charles G. Kibbe Jr., 2073 Cherry avenue, Long Beach, is representative.

LOS ANGELES—U. S. Propellers Inc. has been incorporated with 2000 shares no par value by H. G. Warren, Hampton Wentworth and C. C. Schwartzenbach, all of Los Angeles. Robert W. Walker, 950 South Broadway, is representative.

LOS ANGELES—Steel Forming Corp., 1618 McGarry street, will build a plant 34 x 54 feet, costing about $2800.

LOS ANGELES—Aluminum Bronze Tool Co., 354 South Spring street, has been formed by Irving Grossman, Philip Goldstein and L. S. Rich.

LOS ANGELES—Western Screw Products Co., 7757 Miramonte boulevard, has been formed by Lewis Kovats and John C. Patrick.

LOS ANGELES—Newport Shipbuilding Co. Ltd., 453 South Spring street, has been formed by Vincent H. Olson.

LOS ANGELES—ABCO Metalcraft, 1008 North Highland avenue, has been formed by Joseph F. Hypes Jr.

LOS ANGELES—Victory Tool Co., 4351 Glendale boulevard, has been formed by George L. Brown and associates.

LOS ANGELES—Marshall Tool & Supply Co., 2038 Santa Fe avenue, has been formed by Irving Harris, Carl Marshall and Mack Marshall.

LOS ANGELES—R. C. Porter Aircraft Corp. has been incorporated with $25,000 capital by C. A. Haynes, Montrose, Calif., and associates. Louis G. Frye, 12023 Ventura boulevard, Los Angeles, is representative.

LOS ANGELES—Steel Forming Corp., 1619 South Alameda street, is building an addition covering 6000 square feet in which equipment costing $40,000 will be installed to expand production of airplane parts and other defense products.

LOS ANGELES — Consolidated Steel Corp., 5700 South Eastern avenue, will build plant addition 45 x 64 feet, to cost about $21,000.

LOS ANGELES—Henes-Morgan Machinery Co., 1637 Compton avenue, will build a machine shop addition 38 x 72 feet, to cost about $4500.

LOS ANGELES—Quality Foundry Mfg. Co., 2707 East Twenty-sixth street, is building an addition to its plant.

RIVERSIDE, CALIF.—City council has retained Headman, Ferguson & Carollo, engineers, 319 Homebuilders building, Phoenix, Ariz., to prepare alternate estimates on three types of sewage treatment plants and act as consultants. Plant estimated to cost over $25,000.

SOUTH GATE, CALIF.—Harry Keller Smelting & Refining Co., 9400 Rayo avenue, has been organized by Harry Keller, South Gate.

SOUTH GATE, CALIF.—American Concrete & Steel Pipe Co. will build an addition to its plant at 4635 Firestone boulevard, 60 x 100 feet, costing $10,000.

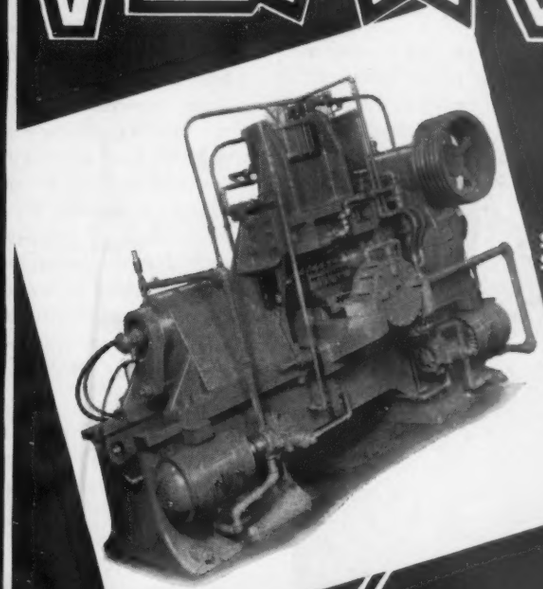
TORRANCE, CALIF.—National Supply Co., will spend $2,000,000 in expansion project, including a building 150 x 750 feet to enlarge forging facilities for production of drive shafts and other forgings for Navy and Maritime Commission.

Washington

KELSO, WASH.—City has sold $200,000 bond issue to finance its proposed water system program. Plans are by R. G. Andersen and J. L. Henderson.

PULLMAN, WASH.—City will call for bids soon on proposed sewage disposal plant. Major E. B. Parker is in charge.

WEAN EQUIPMENT *for* DEFENSE



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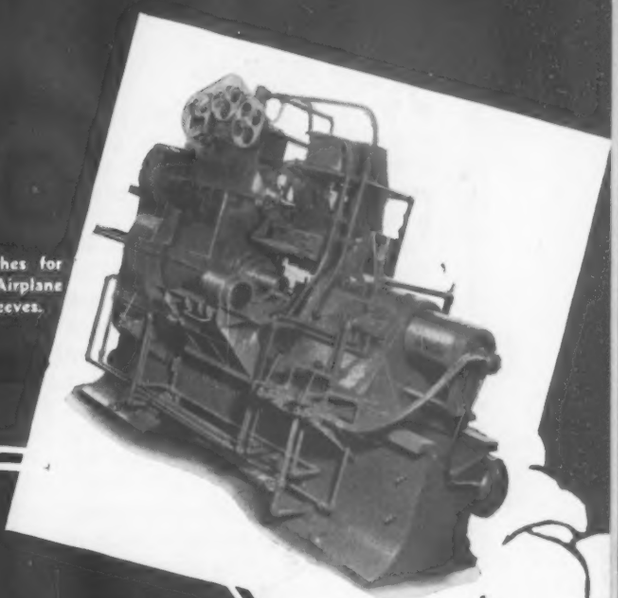

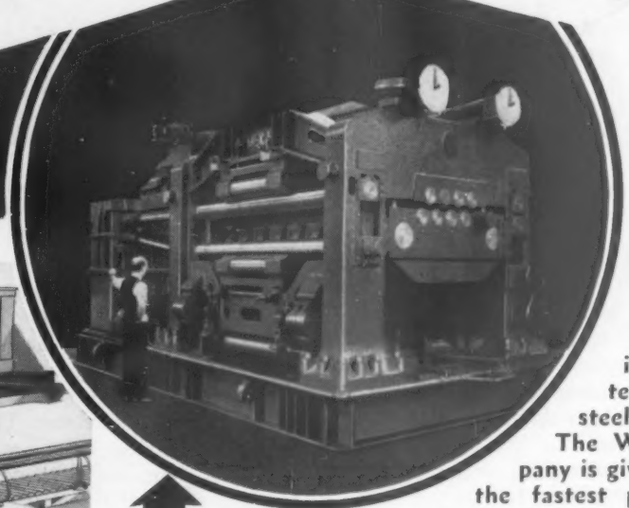

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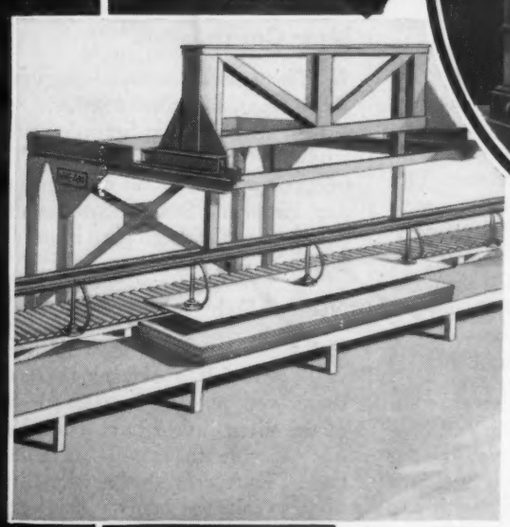

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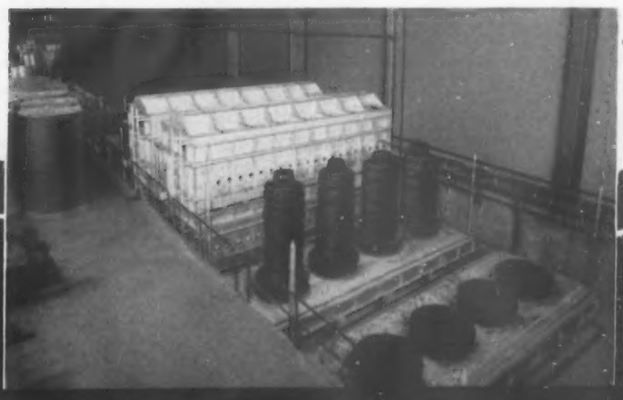

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Behind the Scenes with STEEL

Defense Sidelights

■ W. H. R. of Youngstown passes along this story which is going around the Valley, and which adds another colorful brush stroke to the hectic picture of defense.

It seems a local producer down that way was working on a government pipe order when a call came from Washington checking on when delivery would be made. The producer told the fellow on the other end of the line that the pipe was made and that they would put the threads on at once and ship the following Saturday.

The fellow in Washington seemed satisfied and the producer went to work on some of his other worries. But later that afternoon he had this wire put on his desk:

SHIP THE PIPE. LET THE THREADS COME LATER.

Folderol

■ We haven't tried it yet, but do you have any idea what would happen if you simply took an ordinary sheet of letter paper and folded it 38 times? Sounds easy but you'd probably end up in the booby hatch because to begin with you'd get 275,000,000,000 thicknesses. And assuming the paper was about .001 inches thick you'd end up with a hunk 275,000,000 inches thick, or approximately 5200 miles. If you try it and it works, will you send along a copy for our files?

High Powered

■ Million-volt x-rays, until recently obtainable only with elaborate equipment and used in a few hospitals for cancer treatment, have now put on overalls, so Engineering Editor George Birdsall learned on a recent visit to the General Electric Co. at Schenectady. The million-volt outfit will photograph through five inches of steel in two minutes and to prove it with a vengeance the G. E. technicians proceeded to photograph the gears in George's watch through *six* inches of steel as shown here. The photo shows Ed Bremer of *The Foundry* at the right, and George next to him, with C. D. Moriarity of the G. E. lab at the extreme left. The next size smaller x-ray unit available would take something over three and a half hours, so inspection time is stepped up 40 times or more. The new equipment permits the economical inspection of steel castings and at Ford Motor, for example, it saves over 80 per cent of the man-hours required with the smaller unit. The full time of an average of six men for four years went into the successful development of the new unit—another tremendous stride forward in the science of metallography.

Growing Resentment

■ In a letter to E. L. Shaner, commenting on his recent editorial "Social Gains—Real or Imaginary," the president of a well-known St. Louis manufacturing company has this to say:

Unionism cannot exist without terrorism. There is a very good example here in St. Louis right now, where there have been some defalcations in the Hodcarriers Union. The members have been asked to raise a fund to defend the officers. Some of the members are not in favor of this and have therefore appealed to the prosecuting attorney that a meeting be held whereby those who are not willing to support their officers can voice themselves and be assured of freedom from attack. Unions terrorize individuals to force them to become members of their organization and even terrorize their own members!

In reply, Mr. Shaner says in part:

Such gains as the labor movement has made since 1933, which were acquired by force or coercion, cannot be retained. Sooner or later the United States will adopt legislation similar to that which has been in existence in England for about twenty-five years, which prohibits coercion or intimidation of any kind on the part of unions or anyone else. I think such a law is coming but it will not be enacted until the people are more thoroughly aroused than they are now.

New Composites

■ This week, STEEL inaugurates new price composites which will give a much better breakdown for studying market trends. The new composites, found on page 114, are Finished Steel, Semi-Finished Steel, Steelmaking pig iron and Steelmaking Scrap.

Nice Affair

■ Before we forget the Metal Show until next fall, we want to run a thank you note to J. & L. for one of the nicest little affairs it has been our pleasure to attend for a long time. Each year during the Metal Show week, the advertising department of J. & L. turns the tables and entertains the trade and business paper publishers at a buffet supper which for sheer good food and hospitality we've never seen equaled, says we, still dreaming of that delicious lobster Newburgh and those dozens of oysters we put away.

Vol. 109, No. 18, November 3, 1941, issue of STEEL, published every Monday at Cleveland, O. Entered as second class matter at the postoffice, Cleveland, O., under act of March 3, 1879. U. S. and Canada, 1 year $4; 2 years $6; foreign countries, 1 year $10; Current issues, 25c.